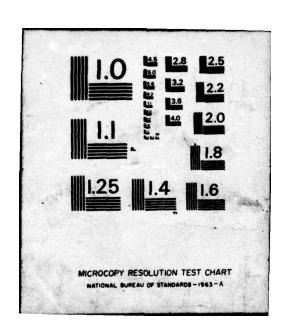
COASTAL ZONE RESOURCES CORP WILMINGTON N C

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEM--ETC(U)

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STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT

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Case Studies
D-23-1 to D-29-1



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Submitted to Office, Chief of Engineers U.S. Army • Corps of Engineers

By Coastal Zone Resources Corporation Wilmington, North Carolina

May 1975

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23. HARTWELL RESERVOIR
South Atlantic Division
Savannah District
South Carolina and Georgia

#### I. SETTING

## A. Location

Hartwell Reservoir is located approximately 89 miles (mi) above Augusta, Georgia on the Savannah River. Approximately 75% of the reservoir lies in South Carolina and 25% in GA. The reservoir is situated in the mountain area of the Blue Ridge and the Piedmont Plateau. The setting is essentially rural, however, development pressures in the form of subdivisions and apartments are creating an urban situation around the border of the reservoir (1).

Primary access to the area is provided by I 85, which spans the reservoir approximately 15 mi north of the dam, connecting major metropolitan areas in GA and SC. Encircling the reservoir and connecting to I 85 are numerous primary and secondary roads (Figure D.23.1).

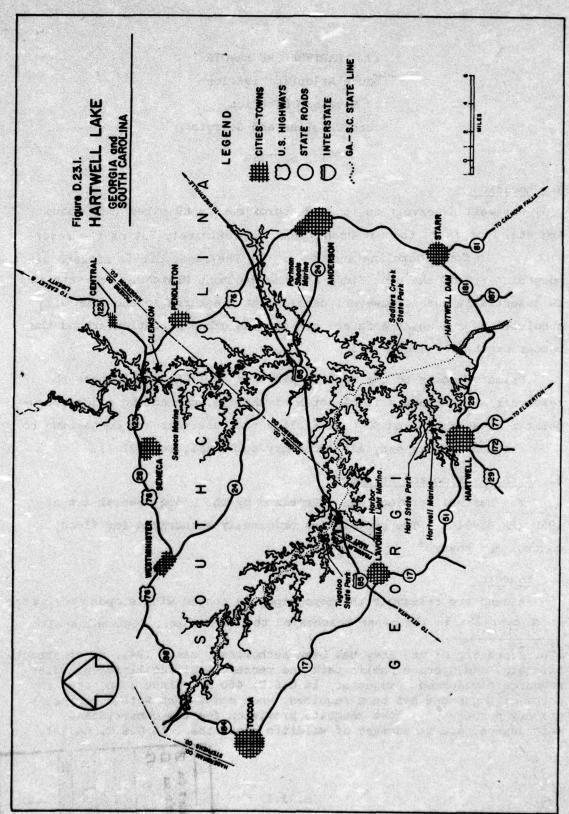
# B. Authorization and Purposes

The Hartwell project was authorized by the Flood Control Act of 1950 (PL 81-516). The project was originally authorized for flood control and power. a

## C. Features

Around the reservoir the topography is rugged with slopes varying from 5% to over 25% in the upper reaches of the reservoir. Peninsulas with

The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460 d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).



irregular shorelines, form numerous bays over the length of the reservoir. In addition a number of islands are located in the reservoir (1).

Soils in the upper reaches of the reservoir are moderately deep, loamy and clayey soils, runoff is rapid and soil erosion is a hazard when areas are cleared (2). In the lower reaches of the reservoir, soils are deep, well drained, and have severely eroded surface layers on moderately steep slopes (3).

Vegetation consists of cut-over mixed pine, and upland hardwood forests; bottomland hardwoods occur along the tributaries leading to the lake.

Upstream from the dam, runoff is regulated over 2,088 square (sq) mi of the Savannah River Basin (4). Lake fluctuations are influenced by streamflow, power production demand, and regulated and required releases for flow maintenance below the dam. Excluding drought periods, the Corps expects water levels to be at 660 feet mean sea level (ft msl) in May of each year; from May through August, water levels will be within a few feet of elevation 660 ft msl. From September through November, the lake will recede from about elevation 655 to 645 ft msl. Rising lake levels are encountered and controlled from December through April, until the maximum power pool is reached in May. Periods of sustained heavy rainfall will cause the pool to rise above elevation 660 ft msl for short periods of time. Corps data obtained through 1964 indicates that lake levels above elevation 660 ft msl occur 9% of the time from May through September (1).

Hydroelectric power is generated by four, 66,000 kilowatt units which are capable of generating 453,000 kilowatt hours annually (5). Other project features are presented on Table D.23.1.

Table D.23.1. Resource Statistics, Hartwell Reservoir.

Date of Authorization		May 17, 1950 <sup>a</sup>
Rights in Land Acquired Between		1952 to present
Date of Impoundment		February, 1961 <sup>C</sup>
Date of Full Operation	in that a return that the	December, 1962 <sup>C</sup>
Lake Size When Water Level is at:		
Top of Flood Control Pool (665	ft msl)	61,400 acresa
Normal Pool Elevation (660 ft	msl)	55,950 acresa
Normal Minimum Pool Elevation	(649 ft msl)	45,450 acresa
Minimum Design Elevation (625	ft msl)	27,650 acresa
Water Fluctuation - Summer Recreati		5 feet <sup>a</sup>
Shoreline at Normal Pool		962 miles <sup>C</sup>
Held in Fee Simple by Corps		962 miles <sup>C</sup>
Land Area Managed by Corps		
Total Land Acquired		80,159 acres <sup>C</sup>
Fee Title in U. S.	77,883 acres <sup>C</sup>	
Easements	676 acres <sup>C</sup>	
River Bottom	1,600 acres	Marie Stevens
Project Operation Lands	when the balls of a	1,137 acres <sup>C</sup>
Manageable Resource Lands	And the first	22,396 acresd

<sup>&</sup>lt;sup>a</sup>Savannah District. 1965. Hartwell Reservoir, Savannah River, Georgia and South Carolina, the master plan, public use and administrative facilities design memorandum 22-B. Savannah, Georgia.

<sup>&</sup>lt;sup>b</sup>Personal communication, November 1974. Savannah District, Real Estate Division, Savannah, Georgia.

CRRMS. 1973.

d Total Project Land minus (Land Flooded at Normal Pool + Project Operation Land + Easements).

## II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

## A. Analytical Unit

There are six counties in GA and SC which border Lake Hartwell. In 1970 the population of these counties was over 254,087 and had an average per capita income of \$2,297. The greatest population increases, from 1960 to 1970, occurred in Pickens and Anderson Counties, SC and in Stephens County, GA. These counties are located around the northern portion of the reservoir through which I 85 passes. The counties located around the southern portion of the reservoir have exhibited small increases in population with Franklin County, GA declining in population (Table D.23.2). Supporting growth and development on the SC side is a complex transportation network which intersects with the main transportation arteries of U. S. 76, I 85, and U. S. 29. This system provides convenient routes for commuting lake residents. On the GA side of the lake, development and growth are not as great; however, roads are just as numerous but are of lesser quality than those in SC.

Communities affected by recreation and development around the reservoir form a triangular analytical unit around the lake encompassing the communities of Toccoa, Lavonia, and Hartwell, GA; and Starr, Anderson, Greenville, Easley, Liberty, Central, Pendleton, Clemson, Seneca, and Westminister, SC. Interstate 85 bisects this unit from Lavonia, GA to Greenville, SC (Figure D.23.1). Consequently, the transportation system combined with growth and development in the project area is effectively changing the recreational usage around the reservoir from low intensity use to high intensity use.

Flood control features of Hartwell Dam primarily affect Augusta, GA and North Augusta and Hamburg, SC by regulating flows downstream to the Clark Hill Dam. Other areas affected include 200,000 acres of fertile lowland between Augusta and Savannah, GA (1). Hydroelectric power generated at Hartwell Dam serves markets throughout the southeast.

Table D.23.2. Population and Income of Counties Bordering Hartwell Reservoir.

	Popul	lation		Per Capita
County	1960	1970	% Change	Income
Stephens County, GA	18,391	20,331	+98	2,347
Franklin County, GAa	13,274	12,784	-48	2,059
Hart County, GA	15,229	15,814	+4%	2,031
Anderson County, SCb	98,478	105,474	+7%	2,558
Pickens County, SCb	40,030	58,956	+32%	2,486
Oconee County, SCb	40,204	40,728	+2%	2,303

<sup>&</sup>lt;sup>a</sup>U. S. Bureau of the Census. 1971. U. S. census of population: 1970; number of inhabitants: Georgia. Washington, D. C.

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b. U. S. Bureau of the Census. 1971. U. S. census: 1970; number of inhabitants: South Carolina. Washington, D. C.

## B. Ownership

The Corps, in 1952, planned to acquire 101,500 acres for project purposes; in 1955 this was revised downward to about 84,000 acres (4, 6). Ultimately the Corps acquired 77,883 acres plus 676 acres in flowage easements using the 665 ft msl contour line as a guide for acquisition (1, 7). Consequently the Corps administers a narrow strip of land averaging about 200 ft in depth around the 962-mi shoreline. Approximately 50% of the Corps' boundary has been monumented (7). Lands contiguous to and surrounding Corps lands are private properties. Due to the lack of well-defined boundaries many private owners have encroached on Corps properties resulting in property disputes with the Corps. There are no significant state or local government-owned properties within the project area.

## C. Resource Management

## 1. Recreation

within a 100 mi radius of Hartwell Lake the 1970 population approximately 4 million and included the metropolitan areas in Asheville, North Carolina, Greenville, Spartanburg, and Columbia, SC, and Athens, Atlanta, and Augusta, GA (7). Greenville, Spartanburg, and Athens are within 1 hour's driving time of Lake Hartwell. Additionally, the reservoir offers the closest water based recreation to these cities. The other metropolitan areas are within 2 hour's driving time of Hartwell Lake via the interstate system; however, they are within shorter driving times of other reservoirs which offer recreational opportunities.

Total investment of all Corps-related recreational development through July 1974 has been \$2,448,500, with \$1,541,000 coming from regular funds, \$688,700 from 711 funds and \$208,000 from 712 funds (9).

Within the project the Corps operates and administers 78 recreational areas which occupy 3,298 acres (7). These recreation areas range in size from 1 acre to 369 acres. Fifteen of the sites provide

space for tent and trailer camping. Twelve of the camping areas collect a fee of \$2 per automobile from April 16 through September 30 (10). All other recreational areas are designated for day-use only; facilities offered at these sites include camping sites for tents and trailers, running water, picnic tables, stoves, boat ramps, comfort stations, refuse containers, swimming areas, and parking lots. All sites visited during the field study were well designed, located, and maintained. Directional signs for the visiting public were strategically placed. Site design incorporated controlled access, separation of day use and overnight facilities, and easy access to the water from all campsites or picnic areas. Site planning for new facilities are developed at the district office and sent to the project for implementation. Plan refinements and modifications are performed on site by project personnel (11). Project personnel have also developed and maintain a dirt bike trail. This trail is located below the dam and parallels an underground pipeline easement. Conflicts between bikers and other visitors has been eliminated as the trail is of sufficient distance from other recreation areas. Project personnel alter the bike course annually by changing grades and curves. This action alleviates the problem of bikers becoming bored with the course and keeps them in the area authorized for such use (11).

In 1973 total visitation at all the recreational areas was 4,624,213 with recreational day use recorded as 6,632,000. Day use exceeded the forecast made in 1965 by almost 3 million (1, 7). Reasons for this unexpected increase are: (1) easy access from large metropolitan areas in GA and SC via I 85, and (2) underestimation of private development which has expanded supportive facilities and increased the permanent and summer residents in the immediate vicinity. Subsequently, the carrying capacity for the recreation areas has been exceeded, resulting in destruction of vegetation and continual maintenance problems (9, 11).

To remedy this situation, project staff is planning to close the most abused areas after peak visitation periods to allow vegetation to become reestablished and to repair facilities (11). Boating, water skiing, and fishing activities account for 63% of all recreational activity (7). The resultant high boating density is considered to be a serious problem by project personnel (11).

There are 6 marinas (Table D.23.3) leased from the Corps which occupy 199 acres. The marinas offer a variety of services to the visiting public, which includes boat docking and storage, boat and motor sales and repair, food services, baits and tackles, fuel, and camping areas. In 1973 the concessions received 457,635 or 10% of the total visitation reported for Lake Hartwell (7).

During the field survey a large and a small marina were visited. Observations made at both marinas revealed an unkempt appearance as access roads were potholed and littered and some areas had a heavy growth of grass while other areas were bare and needed vegetation. Buildings and docks needed painting or repair.

Both marinas had set aside areas for the disposal of junk boat trailers and other large miscellaneous items. Project personnel felt concessioners were operating substandard facilities and were not living up to their lease agreements. Additionally, efforts instituted at the project level to bring the concession facilities up to required standards have not been supported by the Real Estate Divison (11). Consequently the concessioners feel that project personnel have no real authority over them and continue to operate substandard facilities.

Concessioners receive competition from development of similar businesses on private land adjacent to the lake. Such competition offers similar services except for boat mooring and water access. Concessioners are also competing with facilities offered at state parks

Table D.23.3.Outgrants for Recreation -- Commercial, Lake Hartwell. a

				Rental				Inve	Investment	
Location	Grantee	Instrument	Date	Term (yrs)	Basis	Annual Rent Paid (\$)	Acreage	To 1974 (\$)	Planned (\$)	Turn-
Seneca	G. F. Bitzer	Lease	1964	25	Fixed +	3,005	36	56,195	N/A <sup>b</sup>	7
Big Water	Big Water, Corp.	Lease	1973	30	Fixed	009	7	3,413	N/A	0
Hartwell Marina	Hi-Dri Marina, Inc.	Lease	1966	52	Fixed +	009	22	233,202	N/A	7
North Lake Hartwell	Same	Lease	1961	5	Fixed	175	5.7	N/A	N/A	2
Portman Shoals Marina, Inc. Same	Inc. Same	Lease	1962	25	Fixed +	965	44.3	300,000	N/A	-
Harbor Lights Marina, Inc. Same	Inc. Same	Lease	1965	30	Fixed + & gross	100	14.1	146,071	N/A	-
Total (current)	the state of the s	udi s				5,445	199.1	738,881		

Personal communication, November 1974. Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia.

b<sub>Not</sub> available.

on properties leased from the Corps (12). The short-term camping offered by the Corps and state parks results in low use of camping facilities at the concession by short-term campers. Subsequently, to offset low use, the concessioners allow long-term rentals of campsites resulting in temporary residents on concession grounds.

0

The fact that each concession operation except one has changed hands at least once offers strong evidence of problems with the concession outgrant program. The reasons may be: (1) poor selection of concession sites in the master plan, (2) over estimates of visitation which encouraged excessive capital investment, (3) competition from facilities built upon private land to serve housing developments, and (4) incompetent operators. The difficulty experienced in finding operators for privately built service establishments may have made real estate officers reluctant to enforce compliance from existing lessees.

There are no other federal agencies administering lands around Lake Hartwell. However both state and local governments are leasing Corps lands around the lake for recreational purposes (Table D.23.4).

Hart State Park, which occupies 147 acres, is located 2 mi north of Hartwell, GA; Tugaloo State Park occupies 393 acres and is located 6 mi from Lavonia, GA. Both parks are administered by the Georgia Department of Natural Resources, Parks and Historic Division. Full recreational facilities are offered at each park, including concessions and cottages or trailers; these facilities are operated by the state. Tugaloo State Park also offers hiking and miniature golf. In 1973 the two parks had a permanent staff of 10 employees and reported an attendance of 513,000 (13, 7). SC administers Sadler Creek State Park which occupies 394 acres and is located 4 mi north of Hartwell Dam. Visitation recorded for 1973 was 110,692 (7). The park offers swimming, picnicking, camping, and boat launch facilities and bath/change unit (7).

Table D.23.4. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Lake Hartwell.

		Rental	1			Inve	Investment
Grantee	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	To 1974 (\$)	Planned (\$)
State of South Carolina, Dept. of Parks, Recr. &							
Tourism	Lease	1966	25	0	394.0	328,107	N/A <sup>b</sup>
Stephens County, GA	License	1962	25	•	9.3	5,845	M,A
State of Georgia Div. of State Parks	Lease	1965	20	0	393.0	577,472	30,806
Stephens County, GA	Lease	1963	25	0	17.0	7,535	8,825
City of Anderson, SC	Lease	1969	25	0	28.0	41,500	895'69
State of Georgia Div. of State Parks	Lease	1968	25	0	147.5	17,200	325,000
State of South Carolina, Dept. of Wildlife Resources License	License	1965	.52	0	22.8	A/A	N/A
State of Georgia, Dept. of Natural Resources	License	1962	8	•	11.2	N/A	N/A
Total (current) 8					1,022.7	977,659	434,199

Personal communication, November 1974, Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia.

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Stephens County, GA has two recreation areas under license from the Corps. One park provides a boat launch ramp for lake access, the other park provides picnic sites and a boat launching ramp. Reported visitation for 1973 at both of these facilities was 40,320. Anderson City, SC has leased a 24-acre recreation area which provides only boat launching facilities and reported 180,600 visitors in 1973 (7).

All state and local recreation areas were developed or partially developed by the Corps prior to state and local administration. In 1965 the Corps designated 14 areas for development by state and local government with Corps participation; to date six areas are under lease or license by state or local governments as parks or access areas. In 1973 state and local parks accounted for 18% of all visitation recorded on Lake Hartwell.

There are 12 quasi-public organizations leasing 266 acres for recreational use. The lease terms range from 2 to 25 years with all lessors paying \$1 annual rent (Table D.23.5). There are five private organizations leasing 29 acres from the Corps for recreational use. Each lease is for a 20-year term with a total annual rent of \$3,165 (Table D.23.6).

#### 2. Lake Resources

Both SC and GA have classified waters in Lake Hartwell as suitable for swimming and water contact sports (14, 15). In GA there are 10 waste water treatment plants with a combined design flow of 5.61 million gallons per day (mgd) which discharge treated effluent into tributaries which flow into Lake Hartwell (16). The number of waste water treatment plants in SC which discharge treated effluent in Lake Hartwell is not known. However there are 6 facilities, 5 in SC and 1 in GA, which withdraw water from Lake Hartwell for domestic and industrial use (14).

Table D.23.5.Outgrants for Recreation -- Quasi-Public, Lake Hartwell.

			Rental				Inve	Investment
Location Grantee	Instrument	Date	Term (yrs)	Basis	Current Annual Rent (\$)	Acreage	To 1974 (\$)	Planned (\$)
Clemson University	Lease	1965	25	1	1		N/A <sup>b</sup>	N/A
N.E. Ga. Girls Land Conference	Lease	1965	10	1			N/A	N/A
Clemson University	Lease	1965	25	1	<b>-</b>		N/A	N/A
Toccoa Camp Fire Girls	Lease	1965	10	1	-		N/A	N/A
1st Presbyterian Church	Lease	1961	10	1	•		N/A	N/A
Old 96 Girl Scout	Lease	1968	10	1	1	7.5	N/A	N/A
Clemson University	Lease	1969	10	1	1		N/A	N/A
Henderson Senior Citizens	Lease	1970	2 <sub>C</sub>	1	4		N/A	N/A
Knox Presbyterian Church	Lease	1970	2 <sub>C</sub>	1	1		N/A	N/A
Colebrook Baptist Church	Lease	1970	2	1	1		N/A	N/A
Devine Service Catholic Church	Lease	1970	20	-	-		N/A	N/A
Anderson School District #5	Lease	1971	20	1	1		N/A	N/A
Totals (current) 12					12	266 <sup>d</sup>		

a Personal communication, November 1974. Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia.

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Terms have been extended.

dotal acreage only received from Savannah District.

Table D.23.6. Outgrants for Grazing, Private Recreation, and Rights-of-Way, Lake Hartwell.<sup>a</sup>

				Rental	la!			Inve	Investment
Purpose	Grantee	Outgrants	Instrument	Date	Term (yrs)	Annual Rent Paid (\$) Acreage	Acreage	To 1974 (\$)	Planned (\$)
Grazing	E. M. Reese	• • • • • • • • • • • • • • • • • • •	Lease	1974	1	40	9.2	N/A <sup>b</sup>	N/A
Grazing	J. I. McGukin		Lease	1974	1	135	51.0	N/A	N/A
Private Recreation	Sumary	S	Lease	-	8	3,165	29.0	N/A	N/A
Power-Line	Rights-of-Way	966	Easement	1	50 to Indef.	N/A	740.0	N/A	N/A
Sewer-Line	Rights-of-Way	17	Easement	1	30-50	N/A	12.8	N/A	N/A
Roads	Rights-of-Way	02	Easement	1	50 to Indef.	N/A	555.2	N/A	N/A
Water-Line	Rights-of-Way	103	Easement	1	50 to Indef.	N/A	358.2	N/A	N/A
Railroad	Rights-of-Way		Easement		20	N/A	43.8	N/A	N/A
Telephone	Rights-of-Way	31	Easement	1	50 to Indef.	N/N	23.4	N/A	N/A
Gas & 011	Rights-of-Way	•	Easement	1	20	N/A	46.2	N/A	N/A
Totals (current)	ent)	1,237				3,310	1,868.8		

Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia. Personal communication, November 1974.

bot available.

Sport fishing is a major attraction on Lake Hartwell and accounts for 36% of activity use (7). Both GA and SC reciprocally honor fishing licenses and creel limits for Lake Hartwell and the Savannah River (17).

Activities performed by the South Carolina Wildlife and Marine Resources Department (SCWMRD) include trout and hybrid bass stocking, survival and growth studies, creel censuses, and a study of walleye spawning and food habits (18). Of the seven reservoirs in SC, Lake Hartwell is ranked second in terms of total harvest (numbers and weight). SCWMRD has estimated that 732,219 fish weighing 285.4 tons were harvested from Lake Hartwell in 1971, having a value of \$1,506,000 or \$24.55 per surface acre (18). Crappies, bluegill, and largemouth bass are the most common sport fish taken with rainbow trout reported as being least caught (18).

Below the dam rainbow trout are stocked on a put and take basis by both GA and SC (17). Temperatures for trout survival in the tailrace are monitored and controlled by the Corps through controlled releases which keep the temperature at 70°F or below for a distance of 7 to 8 mi downstream (11). Regarding downstream fisheries, the USF&WS recommended in 1965 that "...the Corps should provide a minimum periodic flow below the dam of at least one unit discharge for one hour within any 48 hour period until other flow requirements that may be necessary for fish protection are determined." (1). The Georgia Game and Fish Division (GGFD) feel that present releases are not sufficient during low power use periods. At times there is no flow at all. To compensate for this inadequacy the GGFD would like to see a constant minimum flow of 600 cubic feet per second (cfs). The GGFD also reported that due to bottom discharges from the dam, dissolved oxygen (DO) was at times very low and inadequate for trout survival, resulting in trout concentrations around the mouths of tributaries which have sufficient DO (17). The Corps

has not supported tailrace fisheries due to the downstream danger to fishermen by rapidly rising river levels during large releases. To offset this danger, the Corps is installing a system to warn downstream fishermen before large releases are made (11). Another problem as reported by SCWMRD deals with drawdowns of Lake Hartwell for Corps project purposes. Some drawdowns not coordinated with SC have resulted in Walleye kills (19). However water fluctuations during the spring of each year are minimized by the Corps /reportedly the level is not lowered more than 6 inches (20)/ to aid in the reproduction of bass and crappie (20). In the past both the GA and SC fish and wildlife agencies worked together on Lake Hartwell through an advisory committee; however, this committee is no longer active and most stocking is performed by each state without the other's knowledge (8, 17, 19). The Corps has recently hired a fisheries biologist to be quartered at the Clark Hill project. One of his jobs will be to act as liaison between the two states and to attempt to resolve management problems and misunderstandings (7).

## 3. Wildlife

Waterfowl usage of Lake Hartwell is poor; during migratory periods small numbers of waterfowl utilize the lake for resting. Three islands were recognized by the USF&WS in 1965 as potential waterfowl management areas and were so designated by the Corps. The islands are located in SC south of the Tugaloo and Seneca Rivers. The management plan designated food planting to attract waterfowl (1). Plans were instituted by the Corps and shoreline areas were cleared and planted. For reasons unknown the program was not successful and the program has been dropped (8).

Due to the narrow strip of land administered by the Corps (200 ft), wildlife management programs for big game species are not practical. Sufficient land is available in some areas to allow management of small

game species including controlled hunting. The Corps has one wildlife biologist who directs and manages the wildlife program on Hartwell. The biologist spends 25% of his time on Hartwell and 75% on the Clark Hill project where he is headquartered. Development of a Hartwell management program by the wildlife biologist is in progress but presently more attention is being directed toward Clark Hill where benefits are more pronounced.

#### 4. Other Land Use

General land use categories of Corps properties in the 1965 master plan were listed as recreational use areas, wildlife refuges and game management areas, and forest lands. Presently the Corps administered lands are primarily used for recreation.

Forestry practices have been implemented around Lake Hartwell by the Corps. These practices do not encompass timber harvesting as the lands are not of sufficient size for economical production. Instead, the Corps plants hardwoods for mast production to attract and hold small game, to offer shade at recreational areas, and for erosion control. They remove infested and infected trees to keep insects and diseases from spreading.

Agricultural practices on Corps land is limited to two grazing leases totalling over 60 acres (Table D.23.6). Agricultural practices have decreased around Lake Hartwell over the last 20 years but are still significant on properties contiguous to the Corps, resulting in encroachments on Corps lands by livestock and fences. One recent problem, resulting in a fish kill, was caused by insecticide sprayed over a cotton field which founds its way into the lake (8).

Other uses of Corps properties concerning rights of way are listed on Table D.23.6 while a summary of all Corps outgrants are shown on Table D.23.7.

Table D.23.7. Summary of Outgrants, Lake Hartwell.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife and Recreation Public Parks	ø	0	1,022.70	659''.
Recreation Quasi-Public	77	12	266.00	N/A
Recreation Commercial	•	5,445	199.16	738,881
Grazing, Private Recreation, and Rights-of-Way	1,237	3,310	1,868.82	N/A
Totals	1,263	8,767	3,356.68	1,716,540

Not available.

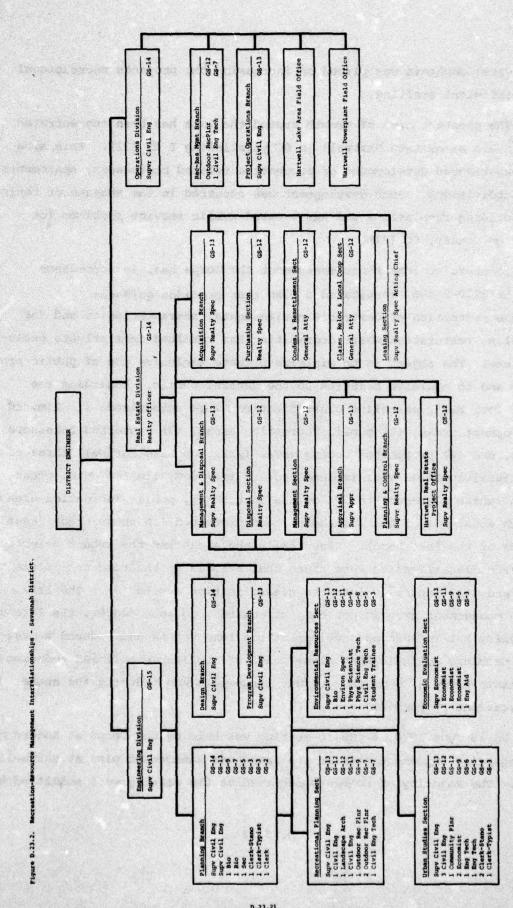
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Archaeological surveys were performed prior to construction and 70 sites in or near the reservoir were indicated. These sites were occupied by prehistoric peoples, beginning at least 5,000 years ago and ending with the lower Cherokee who lost their lands after the American Revolution. Six areas were selected as significant enough to justify excavation and three were excavated (1). Seven notable historic sites were indicated in or around the project area and are discussed within the 1965 master plan (1). Archaeological and historical facts of the project area are related to the public by informational brochures and visual displays which are located at the project manager's headquarters.

#### 5. Resource Use Controls

Reservoir management responsibilities are delegated to three separate offices: Real Estate Project Office, Hartwell Powerplant Office, and Hartwell Lake Office. The first office is responsible to the Real Estate Division of the Savannah District for all real-estate acquisitions. The second is responsible for power production and lake level fluctuations, and the third office is responsible for non-power related resources; both offices report to the Operations Division (Figure D.23.2).

The Hartwell Lake Office is responsible for park and natural resource management and is staffed (according to the Savannah District Organization Chart) as having two resource managers, one supervisory park ranger, one forester, seven park technicians, one administrative aid, one biological technician, one clerk typist, and two temporary clerk stenographers. Maintenance personnel include 17 permanent and 2 temporary employees. The organization chart received from the field office indicated a total of 30 permanent employees versus the 31 permanent and 3 temporary employees shown by the Savannah District. Additionally, a proposed organization chart submitted by the field office to the district in July 1974 called for 51 permanent and 28 seasonal and temporary



employees; emphasis was placed on increasing the projects recreational and biological staffing.

The greatest area of growth around the lake has been concentrated within 0.5 mi of Lake Hartwell in SC paralleling I 85 (21). This area has experienced development of recreation related businesses, apartments, and subdivisions. Such development has occurred in the absence of zoning and building regulations and has created public service problems for Anderson County, SC (21).

To exercise lake shore management the Corps has, in accordance with ER 1130-2-406, instituted a plan that provides guidance for the protection of desirable environmental characteristics and for shoreline restoration where degradation has resulted from private exclusive use. The object is to minimize private exclusive use of public property and to maximize benefits to the general public. Regarding the plan, four basic shoreline classifications were authorized: (1) limited development areas, (2) public recreation areas, (3) protected lakeshore areas, and (4) prohibited access areas (22). On Lake Hartwell three of the classifications were implemented and included, limited development areas (which are equal to 50% of the lakeshore), public recreation areas (which equal 30% of the lakeshore), and protected lakeshore areas (equal to 20% of the lakeshore). Essentially the areas and the amount selected for each classification were areas that existed at the time of implementation and fell naturally into the classification system (8). The lake shore management program not only safeguards, to some degree, the lake's integrity but influences development and land values and reduced management problems by indicating clear zones of applicable policies reducing conflicts between Corps and private landowners and reducing the number of applications of permits.

On 18 June 1974, a public meeting was held by the Corps at Anderson, SC regarding implementation of the lakeshore management plan at Hartwell Lake. The majority of comments received at the meeting were submitted by

adjacent landowners who expressed objections to and or recommended for changes to the proposed plan because they felt the plan would interfere with or limit their exclusive use and enjoyment of the public lands and waters adjacent to their properties. Since completion of the project, lands adjacent to or near the lake have increased in value. The Corps paid an average of \$40 per acre for lands purchased in the early 1950's (6). In 1966 an undeveloped lot was valued at \$4,500; in 1970 the same lot was valued at \$15,000. At present 0.25-acre lots sell from \$8,000 to \$20,000 with the price dependent upon lot location with respect to the lake, the Corps lake-shore restrictions, and subdivision restrictions imposed by the developer (11). Presently there are over 300 platted subdivisions adjacent to Corps properties in both GA and SC, with some having 40 by 40 ft lots (11).

Development adjacent to the lake has degraded aesthetic qualities. Private owners close to the water demand a view of and access to the lake, which has resulted in construction of 2,671 docks and the reduction of lakeshore vegetation (6). At present, 50% of the boundary has been surveyed and monumented. The survey revealed a number of permanent structures on Corps lands. To solve this encroachment problem the Real Estate Division is considering either leasing or selling the properties to the parties in violation (11).

Enforcement of federal regulations applicable to the Corps is performed by the supervisory ranger and five park technicians. This staff patrols 962 mi of shoreline and 80,000 acres of land and water which attracted over four million visitors in 1973. All rangers are headquartered at the project field office and patrol the reservoir in radio equipped vehicles. Response time to areas of disturbance is hindered by the lack of staff. To offset these deficiencies the park manager has proposed to increase the ranger force to 18 permanent and 8 seasonal employees (8). Additionally, reaction time is delayed because

ranger substations are not located at strategic points around the lake nor do they have patrol boats. The majority of park technicians have been hired locally and are familiar on a personal basis with many of the residents around Lake Hartwell. The practice of hiring local people for resource enforcement is a paractice not utilized by state resource agencies as the practice encourages ranger leniency toward violators who are personel acquaintances.

Boat and water safety regulations are enforced with periodic inspections by the U. S. Coast Guard. Game and fish laws applicable to GA and SC are enforced by designated conservation officers.

Mosquito control operations are performed by the Corps biological technicians with peak periods of operation occurring during the winter months. Also included in this operation is aquatic plant control which is instituted when deemed necessary (1).

# III. FINDINGS AND KEY PROBLEM AREAS

## A. Recreation

- 1. In addition to the 78 recreational areas operated by the Corps, four concessions and six state and community parks are under lease from the Corps. All are easily accessible and are evenly spaced around the 962 mi of shoreline managed by the Corps.
- 2. All recreation area site plans are developed at the district office and sent to the project for implementation. Plan refinements and modifications are performed or site by project personnel.
- All recreational areas visited were well designed, located, and maintained. Directional signs for the visiting public were strategically placed.
- 4. Boating, water skiing, and fishing activities account for 63% of the recreational use. The resultant high boating density is considered to be a serious problem by project personnel.
- 5. The 1973 visitation rate (6,632,600) exceeded the 1965 forecast by almost 3 million. Reasons for the unexpected increase are: (1) easy access from large metropolitan areas in GA and SC via I 85, and (2) expanded supportive service facilities and subdivisions which allow easy access to the lake.
- 6. A number of recreation areas are over-used. The project staff plans to close selective over-used areas after the peak visitation period to allow vegetation reestablishment and to perform major maintenance.

#### B. Fish and Wildlife

 The 1965 master plan stated reservoir lands were suited for wildlife refuges and game management areas, forestry, and recreational use. To date, recreational development has been emphasized.

- Waterfowl management has been attempted on three islands in the reservoir; however, this program has not proved successful and has been terminated.
- 3. Recommendations of the USF&WS regarding fisheries in the reservoir and the tailrace were followed by the Corps. However, follow-up checks on discharges and the tailrace fishery have not been performed. The GGFD feels that a minimum constant flow of 600 cfs downstream will improve the cold water fisheries.
- 4. Fishing is considered to be good in the reservoir by both the GGFD and SCWMRD. This fact is illustrated by the high fishing activity recorded on the lake and the high percentage of visitors who fish.
- 5. GA and SC conduct fish stocking programs on the reservoir but the programs are not coordinated. SC conducts creel censuses but the data are not readily available to GA. A coordinating council, established to improve communication between the two states and the Corps, was ineffectual and subsequently dissolved.

## C. Corps and Contiguous Land Use

- 1. The only land management conducted by the Corps is for recreational development. Such development was and is hindered by the narrow strip of Corps land, resulting in small recreational areas which rapidly become overcrowded during peak visitation periods. Subdivision development has increased the values of lands needed for recreational expansion.
- At present there are no zoning or building restrictions required by the counties and development appears to maximize speculative interests.

- 3. Private development has added to the Corps' management problems. Landowners close to the water demand not only access to but a view of the water, requiring landscaping and dock construction which degrade aesthetic values.
- 4. Concessions leased from the Corps compete with surrounding business developments which offer all services to the public except boat mooring.
- 5. Leases were issued for six state and local parks prior to initiation of the cost-sharing provision of the 710 program but no additional park leases have since been executed.
- 6. Property values have increased dramatically since acquisition. The Corps paid approximately \$40 per acre; at present 0.25-acre lots are selling for \$8,000 to \$20,000. The prices paid are dependent upon subdivision restrictions and lake accessibility.
- 7. To safeguard the lake's integrity, reduce the number of applications for permits, and influence development of contiguous lands the Corps has instituted a shoreline management plan which designates 50% of the shoreline for limited development, 30% for public recreation, and 20% as protected shoreline.

## D. Real Estate Programs and Practices

- 1. Survey and monumentation of the project's boundaries were not performed during or immediately after acquisition. At present, 50% of the boundary has been surveyed and monumented. The survey revealed a number of permanent structures on Corps lands. To solve this encroachment problem the Real Estate Division is considering either leasing or selling the properties to the parties in violation.
- 2. In many areas, project personnel feel that the concessioners are operating substandard facilities and are not meeting their

lease agreements. Efforts instituted at the project level to bring the concession facilities up to standards have not been supported by district real estate personnel. Consequently the concessioners feel that project personnel do not have real authority over them and continue to operate substandard facilities.

3. The fact that each concession operation has changed hands at least once offers strong evidence of problems with the concession outgrant program. The reasons may be: (1) poor selection of concession sites in the master plan, (2) over estimates of visitation which encouraged excessive capital investment, (3) competition from facilities built upon private land to serve housing developments, and (4) incompetent operators. The difficulty experienced in finding operators for privately-built service establishments may make real estate officers reluctant to enforce compliance from existing lessees.

## E. Corps Organization

- 1. The resource manager has proposed a reorganization which would increase the ranger section from six to 19 permanent employees and increase the bio-forestry section from two to seven permanent employees.
- Ranger reaction time is delayed because ranger substations are not located at strategic points around the lake nor do they have patrol boats.
- 3. The existing practice of hiring local people for enforcement may encourage leniency toward violators who are personal acquaintances.
- 4. The Corps wildlife and fisheries biologists stationed at Clark Hill are recent additions; their responsibilities include acting as laision between the respective states, the Clark Hill and Hartwell projects, and the district.

## F. Environmental Problems

Lake Hartwell water is classified by both GA and SC as suitable for recreation use and is utilized by some communities for water supply and for the dumping of treated domestic wastes. Water quality may be degraded through increases in uncontrolled development which would increase the discharge of domestic waste and urban runoff.

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# 24. ALAMO LAKE South Pacific Division Los Angeles District Arizona

#### I. SETTING

## A. Location

Alamo Lake is located on the Bill Williams River on the border of Yuma and Mohave Counties, Arizona. Access is provided by a paved road that extends 38 miles (mi) north from U. S. 60 at Wenden and by a graded dirt road that extends 32 mi west from U. S. 93 near Congress (Figure D.24.1). Wenden is the nearest town to the reservoir; the Phoenix metropolitan area is located approximately 148 mi southeast of the project.

## B. Authorization and Purposes

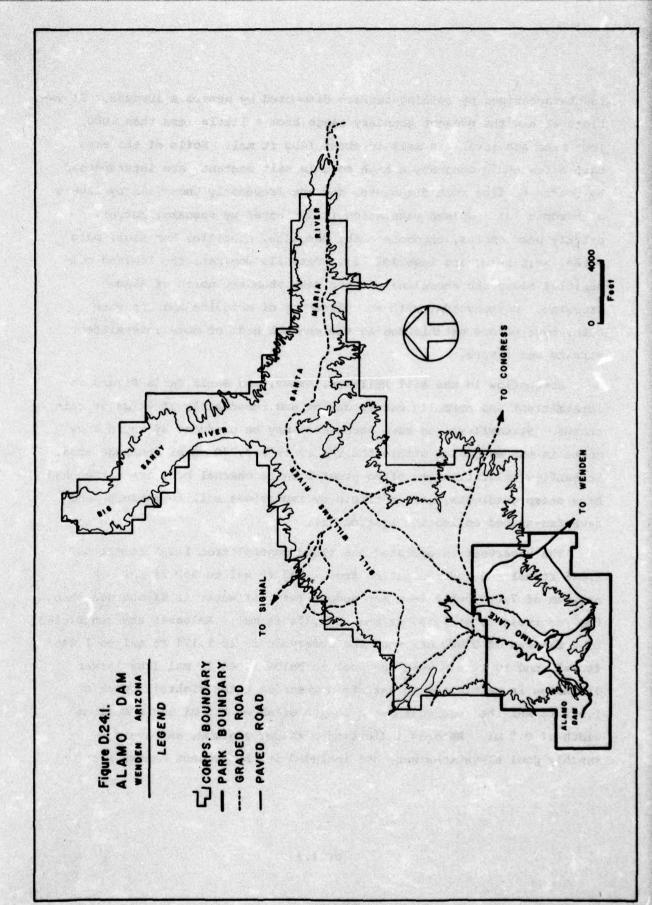
The Alamo Lake project was authorized by the Flood Control Act of 1944 (PL 78-534) (1). The project was originally authorized for flood control, water conservation, and power development (2). a,b

## C. Features

Alamo Lake is situated in the upper reaches of the Sonoran Desert. The damsite lies in a steeply-sloped canyon between the Rawhide and Buckskin Mountain Ranges; the Artillery Mountains border the north side of the project near where the Bill Williams River is formed by the confluence of the Sandy and Santa Maria Rivers. The remaining project land

The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

b Power development is a future project purpose (2).



is characterized by rolling terrain dissected by numerous arroyos. Elevations within the project boundary range from a little less than 1000 feet mean sea level (ft msl) to about 1400 ft msl. Soils of the area have a low humic content, a high soluble salt content, are interspersed by coarse to fine rock fragments, and are frequently underlain by layers of hardpan (3). Upland vegetation is dominated by saguaro, barrel, prickly pear cactus, creosote bush, mesquite, ocotillo, bur sage, palo verde, salt bush, and tamarisk (1). Cattails dominate the lowland communities along the shoreline and are most abundant north of Alamo Crossing. Cottonwoods, with an understory of mesquite and creosote bush, have become established in the channel beds of some intermittent streams and rivers.

Streamflow in the Bill Williams, Sandy, and Santa Maria Rivers is intermittent and normally occurs during and immediately after major rain storms. Streamflows, on rare occasions, may be produced by rapid snow melts in the mountains within the reservoir's 4,770 sq mi drainage area. Streamflow velocities are often great because channel beds are entrenched, have steep gradients, are underlain by impervious soil formations, and have fan-shaped collecting systems (1).

The reservoir is operated for flood control from 1,235 ft msl to 1,046 ft msl and for recreation from 1,046 ft msl to 990 ft msl. A maximum of 7,000 cubic feet per second (cfs) of water is discharged when the reservoir is at 1,235 ft msl to 1,174 ft msl. Releases are restricted to a maximum of 2,000 cfs when the reservoir is at 1,174 ft msl to 1,046 ft msl, and to 10 cfs when the pool is below 1,046 ft msl (the latter discharge is maintained to satisfy downstream water rights). When at 1,046 ft msl the reservoir has a length of about 2.5 mi and a maximum width of 0.5 mi. Records indicating maximum, minimum, and average monthly pool elevations were not included in the project master plan

and were not obtained from other sources (1). a
Other project features are shown in Table D.24.1.

The master plan referred to in this report is a draft provided by the district office; the final master plan had not been completed at the time of our visit.

Date of Authorization	1944 <sup>a</sup>
Rights in Land Acquired Between	1948 - 1969 <sup>b</sup>
Date of Impoundment	July, 1968 <sup>C</sup>
Date of Full Operation	July, 1968 <sup>C</sup>
Lake Size When Water Level is at:	
Spillway Elevation (1,235 ft msl)	13,300 acres <sup>a</sup>
Normal Pool Elevation (1,046 ft msl)	500 acres
Normal Minimum Pool Elevation (990 ft msl)	n/a <sup>d</sup>
Minimum Design Elevation	NA <sup>e</sup>
Water Fluctuation - Summer Recreation Season	2 feet <sup>b</sup>
Shoreline at Normal Pool	9 miles <sup>C</sup>
Held in Fee Simple by Corps	9 miles <sup>C</sup>
Land Area Managed by Corps	
Total Land in Project	22,856 acres <sup>C</sup>
Fee Title in U. S. 22,856 acres <sup>C</sup>	
Project Operation Lands	9 acres <sup>C</sup>
Manageable Resource Lands	22,347 acres <sup>f</sup>

<sup>&</sup>lt;sup>a</sup>Los Angeles District. 1974. Master plan for Alamo Lake (draft). Los Angeles, California.

<sup>&</sup>lt;sup>b</sup>Personal communication, November 1974. Los Angeles District, Los Angeles, California.

<sup>&</sup>lt;sup>C</sup>RRMS. 1973.

d<sub>Not available.</sub>

e<sub>Not applicable</sub>

f
Total Project Land minus (Land Flooded at Normal Pool + Project
Operation Land).

### LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

# A. Analytical Unit

Lands in the project vicinity were in the past and are presently utilized for mineral prospecting, shaft-type mining, and cattle grazing. Virtually no commercial, residential, or industrial development has occurred in response to the reservoir's presence. The project draws about 95% of its recreational clientele from the Phoenix metropolitan area with most of the remaining 5% originating from local areas (4). Populations in Mohave, Yuma, and Maricopa (Phoenix area) Counties increased substantially between 1960 and 1970 and are noted in Table D.24.2.

# B. Ownership

# (a) Corps

RRMS 1973 data indicate that 22,586 acres have been acquired by the Corps for the Alamo Lake project (5). A drawing provided by the district's Real Estate Division, however, implies that 19,603.4 acres have been acquired (7). No explanation for the discrepancy was obtained.

The drawing provided by the Real Estate Division also indicates that 4,714 acres have been acquired in fee title by the Corps, 14,889 acres have been transferred to the Corps from public domain, and that the transfer of an additional 3,488.6 acres of public domain land (presently under BLM jurisdiction) is pending a settlement of grazing rights (7, 8). The latter acreage is divided into numerous parcels, several of which lie contiguous to the reservoir (7). Project boundaries have not been monumented (7).

### (b) Other

Lands contiguous to the project boundary were identified as being held by BLM. Data showing locations of BLM land, acreage held, and number and size of private inholdings (if any) was not obtained.

Table D.24.2. Populations of Mohave, Yuma, and Maricopa Counties Arizona, 1960-1970.

	Pop	ulation	Percent
County	1960	1970	Change
Mohave	7,736	25,857	234.2
Yuma	46,235	60,827	31.6
Maricopa	663,510	967,522	45.8

<sup>&</sup>lt;sup>a</sup>U. S. Bureau of the Census. 1971. U. S. Census of population: 1970; number of inhabitants: Arizona. Washington, D. C.

# C. Resource Management

### 1. Recreation

Recreation facilities have been developed at one site at Alamo Lake. The facilities were built by the Corps using an estimated \$1,520,000 of project funds (1). Construction of the facilities was completed in 1968 and the facilities were initially managed by the Corps (1). Operation and maintenance of the facilities was delegated to the Arizona State Parks Board (ASPB) in 1969 by means of a 25-year lease (1). The lease involves 4,893 acres (Table D.24.3) and the area has since been named Alamo Lake State Park (1). The ASPB has expended \$242,931 for operation and maintenance since the effective lease date and has requested a \$97,600 budget for 1975-1976 (1, 10). Total monies spent for capital investments by the ASPB were not obtained.

Recreation facilities provided at Alamo Lake State Park in 1973 included an amphitheater, 12 picnic sites with shelters, 25 tent campsites, 24 trailer campsites, 2 bath and/or change houses, 1 boat launching ramp with 1 launching lane, 4 parking lots with spaces for 166 cars and 50 car-trailers, an overlook structure, several natural trails, and a visitor contact station that contains interpretive geologic, historic, and wildlife displays built by ASPB (5, 1). Visitation at the site in 1973, based on direct counts by the ASPB, was 41,051<sup>a</sup>. Visitation in 1969, for comparison, was 16,812, and in 1972, the peak visitation year, 43,925 (1, 11). The gasoline shortage is thought to be a major cause of the recent visitation decline (4).

Visitation at the reservoir is greatest in the spring. March, April, and May accounted for 19%, 21%, and 15%, respectively, of the total reservoir attendance from 1969 to 1973 (1). In contrast, June, July, and August accounted for only 6%, 4%, and 3%, respectively (1). ASPB and Corps personnel indicated that weather conditions are ideal

RRMS 1973 data indicate that visitation in 1973 was 42,000. The reason for the difference was not obtained.

Table D. 24.3. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Alamo Lake. a

		Rental	tal	Annual		Investment	ment	
Grantee	Instrument	Date	Term (yrs)	Rental (\$) Paid	Acreage	to 1974 (\$)	Planned (\$)	
State of Arizona, Parks Board	Lease	1969	25	0	4,893	N/A <sup>b</sup>	330,900	
State of Arizona, Game & Fish Commission	License	1970	25	0	22,856	N/A	N/A	
Totals 2					27,749 <sup>d</sup>	•	330,900	

Personal communication, November 1974. Los Angeles District, Real Estate Division, Management and Disposal Branch, Los Angeles, California.

bot available.

CIncludes all project land and water owned in fee by the Corps; overlaps with Arizona State Parks Board outgrant.

dincludes overlapping of leases.

and fishing is excellent during the spring thus accounting for the high visitation rates recorded during this period (12, 11, 4).

The ASPB charges \$0.50 per carload for use of day facilities, \$1.50 for use of the tent camping area, and \$2.25 for use of trailer campsites (11). The fees are charged throughout the year and are collected at the visitor contact station (11). Fees collected from August 1972 through July 1973 amounted to \$13,696 (4).

Data collected from direct counts by the ASPB from August 1972 through July 1973 found that 80% of all reservoir visitors utilized overnight facilities (4). However, RRMS data indicate that only 29% of reservoir visitors utilize overnight facilities (5). Corps personnel did not provide an explanation for the discrepancy. Overnight facilities are heavily utilized because most of the reservoir's recreation clientele travel long distances to reach the project (4, 11, 12).

ASPB personnel stated that many of the existing facilities have been poorly designed, located, and constructed, and consequently detract from the quality of the visitor's recreation experience (11). Noted examples were: (1) The visitor contact station is not located near the park entrance and since several roads intersect with the main thorough-fare prior to reaching the station, visitor confusion has resulted (2) The swim beach is located at the end of a wash. During flash floods the area receives a tremendous influx of debris and is hazardous for public use. (3) The launching ramp presently in operation does not have sufficient pitch and hinders use during high water periods. A second launching ramp had been constructed by dredging a channel towards the shoreline. Wind and wave action caused the channel to fill with sediment and rendered the ramp inoperable. (4) Recreational facilities have been located beyond the 50-year flood line at about 1,255 ft ms1 to 1,250 ft ms1. At recreation pool elevation, the reservoir is a

long distance from the facilities rendering visitor use inconvenient.

(5) many of the public service facilities have been custom designed and built, making replacement and repair difficult. (6) A well for domestic water has been drilled in the reservoir and its pump located on a platform just above the recreation pool; potable water could have been obtained from a nearby upland source. (7) Electrical hook-ups have been placed on the wrong side of trailer pads for camper-trailer use. (8) Water spigots have been built directly over the electrical hook-ups in the trailer camping area, creating safety hazards. (9) Living quarters for park rangers have been located between day and overnight use areas and detract from the visitor's aesthetic view of the project. The latter three problems resulted from developing recreation facilities in an area formerly used for mobile-home housing of damsite construction crews (4, 11).

RRMS 1973 data indicate that picnic site, campsite, and launch ramp deficiencies exist at Alamo Lake (5). The project master plan also states that "Attendance has warranted the updating and addition of recreational facilities to satisfy the present and future demands (1)." The Corps plans to construct in the near future 30 camp and picnic sites, a boat launching ramp, a sewage dump station, and improvements in the existing camp areas (1). The estimated cost of construction is \$330,900 and will require cost-sharing under the Code 710 program (1). The project master plan indicates that the ASPB has verbally agreed to share costs (1). ASPB personnel informed us, however, that the Arizona Attorney General has expressed opposition to the Code 710 program because (1) land ownership would remain with the Corps, (2) the state would not be reimbursed if the project or lease were terminated, and (3) Corps administrative costs are excessive (11). ASPB personnel also felt that the Corps has largely ignored their input regarding recreation planning at Alamo Lake (11). One ASPB official stated "The

Corps tells us what we want for our recreation program (11)." The alleged slighting of the state by the Corps has further increased the ASPB's reluctance to match funds (11).

Although the project master plan indicates that visitation pressures have warranted additional facility development, it does not provide supportive data clearly showing why existing facilities fail to meet demands, nor does the plan identify Corps recreation objectives. District personnel have also stated, in contrast to the project master plan, that is is their philosophy to build additional recreation facilities at Alamo Lake to increase visitation (12).

The project master plan notes that the Arizona Outdoor Recreation Coordinating Commission (AORCC) has indicated that recreation facilities in the state are inadequate (1). According to the master plan, the AORCC recommends that facilities be improved or increased at projects developed in remote areas, such as Alamo Lake, to help reduce deficiencies (1). The master plan fails to explicitly show how recreation planning at Alamo Lake will help alleviate the facility shortage.

The ASPB has requested the Corps to raise the recreation pool 20 ft (to 1,066 ft msl) to provide greater recreation potential and minimize possible water use conflicts should visitation increase (1, 11).

Raising the pool level to 1,066 ft msl would result in an increase in the lake's recreation pool length from 2.5 mi to 3.5 mi, its maximum width from 0.5 mi to 0.6 mi, its shoreline length from 8.9 mi to 20.2 mi, and its water surface area from 500 acres to 1100 acres (1). The Corps noted that raising the pool elevation to 1,070 ft msl would be more feasible from a hydrologic standpoint (1). A confirmed decision to raise the pool level has not yet been made by the Corps (12).

No commercial concessions have been constructed at Alamo Lake though the Corps and ASPB encourage their development (1). An independent concessioner is presently in operation about 6 road mi southeast of the project. The concessioner's clientele includes reservoir visitors and local ranchers. Services provided include food, fuel, and a game room.

No private recreation facilities, such as boat docks and storage sheds, have been built at Alamo Lake. The shoreline, therefore, has a natural appearance.

Four other water-oriented recreation areas have been established within about 100 mi of Alamo Lake: Lake Havasu, Parker Dam and Buckskin Mountain State Parks on the Colorado River, and Lake Carl Pleasant. All four are intensively used and provide recreational facilities similar to those at Alamo Lake (1). Alamo Lake has excellent potential for being maintained as a low-intensity use recreation area because of its remoteness, aesthetic setting, and the presence of the aforementioned, high-intensity use recreation areas. The Corps master plan does not address this possibility.

### 2. Lake Resources

The Arizona Public Health Department (APHD) has classified the reservoir waters suitable for full body contact, partial body contact, warm-water fisheries, aquatic life, wildlife, and agricultural uses (13). APHD is unable to monitor water quality at the reservoir, except on a complaint basis, because of inadequate staffing (13). Some water quality and limnologic parameters are regularly monitored by the Arizona Game and Fish Commission (AGFC) in conjunction with their fisheries management program. Monitoring by the AGFC indicates that alkalinity, chloride, calcium, and fluoride values are relatively high (14, 16).

Corps personnel indicated that water circulation in the reservoir is poor and, during high temperature periods, encourages growth of aquatic weeds (possibly coontail) along areas of the shoreline. The weeds, where present, are unsightly, and make usage of the shoreline difficult for fishing, swimming, boating, boat launching, and boat mooring (11).

ASPB personnel stated that the reservoir receives a tremendous influx of sediment during flash floods and if left uncontrolled would cause the reservoir to rapidly fill (4). The Corps master plan also recognizes the sedimentation problem and notes that 200,000 acre-feet have been reserved for sediment accumulation over a 100-year period (1). The master plan does not indicate that dredging or other control measures will be implemented.

The Corps has leased all project lands (22,856 acres) to the AGFC for wildlife and fisheries management (Table D.24.3.). The Corps initially contemplated leasing only the 17,963 acres of project land not included in the outgrant to the ASPB (15). However, the AGFC requested that the 4,893 acres outgranted to the ASPB also be included, stating that "there would be no conflict in purpose, use, and management between the Arizona State Parks Board and the Arizona Game and Fish Department (14)." The Corps consented to the request and as yet thre have been no conflicts between the two agencies (15, 12).

Fishery management at Alamo Lake is designed for compatible warm-water species that do not present potential overcrowding and stunting problems (16). Managed game species are the largemouth bass, redear sunfish, and channel catfish. The latter two species were stocked in 1969 and 1974, respectively (14).

The AGFC initially contemplated using rotenone shortly after impoundment and prior to any initial stocking in order to eradicate undesirable fish species, such as carp, bullheads, and suckers, from the reservoir and its drainage area (16). The eradication program was never implemented (17). Reasons were not obtained.

The AGFC implied that during impoundment the Corps left a substantial amount of natural vegetation and other debris on the reservoir floor, thus providing favorable spawning and nursery habitat for reservoir fish (14, 16). The AGFC periodically monitors reservoir fish populations by means of reconnaissance surveys, such as electro-shocking and creel censuses (14, 17). Results indicate that game fish reproduction has been excellent but desirable weights for various classes of largemouth bass have not been attained (14, 17). A forage species, such as the plains red shiners, may soon be introduced to promote bass growth (14).

The reservoir fish population is estimated at 300 to 500 pounds per acre (14). Operation of the reservoir for other project purposes has apparently not had adverse effects on the fishery resource (14, 17). A beneficial carp die-off was experienced in 1973 but causes of the kill are unknown (17).

### 3. Wildlife

The wildlife management plan implemented by the AGFC at Alamo Lake has essentially involved only the establishment of a waterfowl rest area near the recreation pool headwaters (14). The AGFC has been reluctant to expand its wildlife management program because a Corps withdrawal order concerning 3,488.6 acres of BLM land is pending grazing jurisdiction settlements (8, 14).

A population of about 450 wild burrows inhabit the upland biotic communities in the project vicinity (4). The burros are protected by the federal Wild Horse and Burro Act and by the State of Arizona's Livestock Sanitary Board (11). Burros heavily graze native vegetation and are considered a nuisance by local residents (4). The animals are fairly easy to see, however, and provide an aesthetic experience for many visitors not accustomed to observing wildlife. Other game species

present in the Alamo Lake vicinity include mule deer, bighorn sheep, jack and cottontail rabbits, Gamble's Quail, White-winged and Mourning Doves, Mallards, Pintails, Redheads, Shovelers, Green-winged Teal, Ringnecked Ducks, and Canada Geese (8). Hunting is permitted on certain areas of the project and is regulated by the AGFC (17).

#### 4. Other Land Use

# (a) Forestry

Extensive timber management practices have not been necessary at Alamo Lake because climatic conditions have prevented establishment of substantial tree cover. Trees have been planted by ASPB to provide additional shade and improve the aesthetic appearance at some recreation areas. Intensive grazing pressures by herbivorous mammals have frequently hindered development of planted trees and future planting may be require fencing (4).

### (b) Grazing

BLM lands contiguous to the reservoir are leased through annual permits to private individuals for livestock grazing. Permit fees are based on the cost of raising livestock on private land. Boundary lines are marked and fenced on many tracts which are repeatedly leased. Fences are also constructed in areas where livestock grazing is prohibited for selected periods to allow vegetative recuperation. Fencing materials are supplied by the BLM but permittees must provide the labor necessary for fence construction (18).

BLM and Corps personnel were contacted to determine the current status and use of 3,488.6 acres of project land subject to the withdrawal of BLM jurisdiction (see Ownership section). Neither agency was able to provide a clarifying explanation. It is not known if these lands are subject to the same administrative and land-use

practices as BLM lands located contiguous to the project.

### 5. Resource Use Controls

The Engineering, Construction-Operations, and Real Estate Divisions are primarily responsible for planning and management of Alamo Lake's recreation resources at the district level (Figure D.24.2). On site Corps personnel consist of two dam tenders whose responsibilities are essentially restricted to management of reservoir pool levels. The Los Angeles District has no on-project park rangers; such personnel have not been needed because the district has delegated management of all on-site recreation programs to other agencies (12).

On-site recreation management at Alamo Lake is performed by ASPB personnel. Staffing presently consists of five permanent employees: one park supervisor, one park ranger, and three ranger assistants (11, 4). Staffing is quantitatively sufficient to perform management responsibilities; no data on education backgrounds were obtained.

GS-15 GS-13 GS-13 Construction-Operations Division GS-13 GS-13 Supv and Inspection Branch Alamo Lake Area Field Office Construction Branch Navigation Branch Operations Branch Supv Civil Engr Supv Civil Eng Supv Civil Eng Supv Civil Eng Supv Hyd Eng GS-12 GS-12 GS-12 GS-11 GS-14 Planning and Control Branch Mgmt and Disposal Branch Real Estate Division Acquisition Branch Appraisal Branch Supv Realty Spec Supv Realty Spec Supy Realty Spec Realty Officer Supv Appr DISTRICT ENGINEER GS-14 68-12 68-11 68-11 68-9 68-9 68-7 68-7 68-7 GS-13 Program Development Branch Water Resources Branch l Supv Civil Eng
l Biol
Civil Eng
Phys Scientist
Civil Eng
I Biol
Geographer
Biol
Geographer
Covil Eng
Biol
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Covil Eng Tech Planning Section Supv Civil Eng Supv Civil Eng GS-15 Engineering Division Supv Civil Eng 68-11 68-11 68-9 68-7 68-7 68-7 68-5 GS-13 GS-14 GS-13 Hydrology and Hydraulics Branch Environ Resources Branch 1 Supv Civil Eng
2 Civil Eng
2 Civil Eng
2 Civil Eng
1 Civil Eng Tech
2 Landscape Arch
1 Lundscape Arch
1 Outdoor Rec Plnr
2 Civil Eng Tech
(1 Temporary) Supv Landscape Arch Design Section Supv Civil Eng Design Branch Supv Hydr Eng

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1

Figure D.24.2. Recreation-Resource Management Interrelationships - Los Angeles Engineer District

D.24.18

Figure D.23.2a Organization Chart - Hartwell WRDP

HARTWELL LAKE	3
John L. Leroy	Manager
Park Manager	GS-12
1 Park Manager	GS-11
1 Supv Park Ranger	GS-9
1 Forester (V)	GS-9
5 Park Technician	GS-7
1 Admin Aid	GS-7
1 Biological Tech (Insects)	GS-6
1 Park Technician	GS-5
1 Park Technician	GS-4
2 Clerk-Steno (Temp) (V)	GS-4
1 Clerk-Typist	GS-3
1 Constr & Maint Foreman	s-10
1 Constr & Maint Foreman	S-8
1 Auto Mechanic	W-10
1 Engr Equip Operator	W-10
1 Preventive Maint Worker	W-9
1 Carpenter	W-9
1 Engr Equip Operator	W-8
1 Automotive Worker	W-8
1 Launch Operator	W-7
2 Motor Vehicle Operator	W-7
1 Pumping Station Opr (Temp	
1 Carpenter Helper	W-5
1 Motor Vehicle Operator	W-9

### III. KEY FINDINGS

# A. Recreation

- 1. Existing recreation facilities have been designed and built by the Corps. The ASPB has been granted a 4,893-acre lease to operate these facilities.
- Existing facilities, however, have been poorly designed, located, and constructed, and detract from a quality recreation experience.
- 3. Development of additional recreational facilities is being planned to meet present and future visitation demands. Development of these facilities will depend on cost-sharing under the Code 710 program.
- 4. ASPB personnel feel that the Corps largely ignored their input regarding recreation planning at Alamo Lake. One park official stated "The Corps tells us what we want for our recreation program." As a consequence of this relationship, ASPB has expressed reluctance to share the cost of developing future recreation facilities. The Arizona Attorney General has also expressed opposition to cost share because (1) land ownership would remain with the Corps, (2) the state would not be reimbursed if the project or lease is terminated, and (3) Corps administrative costs are excessive.

# B. Fish and Wildlife

- 1. The total project acreage has been leased to the AGFC for fish and wildlife management. This outgrant overlaps the lease given to the ASPB but no conflicts have resulted or are anticipated.
- 2. Wildlife management at Alamo Lake has not been intensive and has focused primarily on waterfowl. The AGFC has been reluctant to expand its wildlife management program because a Corps withdrawal order concerning 3,489 acres of BLM land is pending grazing jurisdiction settlements.

3. The AGFC's fishery management program at Alamo Lake is designed for compatible warm-water species that do not present potential overpopulation and stunting problems. Reservoir fish populations are periodically monitored by means of reconnaissance surveys, such as electro-shocking and creel censuses. Monitoring indicates that game fish reproduction has been excellent but desirable weights of various classes of largemouth bass have not been attained. The reservoir fishery population is estimated at 300 to 500 pounds per acre. Operation of the reservoir for other project purposes has apparently not had adverse affects on the reservoir fishery.

# C. Corps and Contiguous Land Use

- 1. Project lands are surrounded by public domain lands. Virtually no industrial, commercial, or residential development has resulted from the reservoir's presence. The closest urban development is located 38 mi south of the project.
- Corps boundaries are not monumented, but encroachment problems have been negligible.
- Development of private recreational facilities, such as boat docks, has not occurred and the reservoir shoreline is aesthetically pleasing.
- 4. Alamo Lake has excellent potential for being maintained as a low-intensity use recreation area because of its remoteness, aesthetic setting, and the presence of sufficient high-intensity use, water-oriented, recreation facilities on the nearby Colorado River. This possibility was not addressed in the Corps master plan.

# D. Corps Organization

The Los Angeles District does not have a ranger program.

Rangers have not been needed because the district has turned over operation of all reservoir recreation programs to other agencies.

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- 17. Personal communication, January 1975. Arizona Game and Fish Commission, Yuma, Arizona.
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25. LAKE ISABELLA
South Pacific Division
Sacramento Division
California

## I. SETTING

# A. Location

Lake Isabella is located on the Kern River in Kern County at the southern end of the Central Valley of California and is about 45 miles (mi) northeast of Bakersfield. The lake is situated in the Kern River Valley on the western slopes of the Sierra Nevada at an elevation of 2,600 feet mean sea level (ft msl) and is bordered by steep mountain slopes which rise to 6,500 ft msl (1).

Primary access to Lake Isabella is provided by U. S. 178 and CA 155. Additionally U. S. 178, CA 155, and Kern 1930 circle the lake. County highway 1930 parallels the north shore of the lake and interchanges with U. S. 178 at the eastern end of the lake and CA 155 on the west side of the lake (Figure D.25.1).

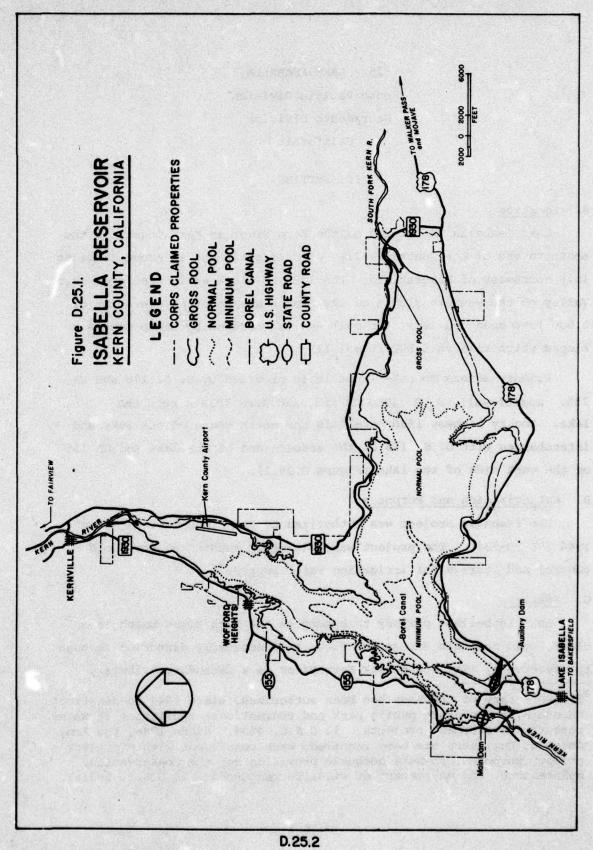
# B. Authorization and Purposes

The Isabella project was authorized by the Flood Control Act of 1944 (PL 78-534). The project was originally authorized for flood control and storage for irrigation water supply. a

# C. Features

Lake Isabella's primary tributary is the Kern River which is a clear, cold mountain stream and flows in a southerly direction through the reservoir. The South Fork Kern River is a secondary tributary

The Secretary of the Army has been authorized, since 1944 to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).



which enters the east side of the lake. The drainage area of the water-shed above the dam is 2,093 square (sq) mi. At normal recreation pool elevation (2,564 ft msl) the lake contains 198,000 acre-ft (1). Other project features are presented in Table D.25.1.

Kern River Valley is essentially an alluvial pocket underlain by granite rock. Soils along the flat alluvial river area are excessively drained. In the more elevated alluvial areas, soils are well drained and moderately coarse (2).

Typical vegetation of the rocky slopes and canyons includes digger pine, oak, juniper, and shrubs. The most conspicuous vegetation bordering the river bottom includes cottonwood, willow, rabbitbrush, sedges, and water-tolerant grasses. Ground cover is characterized by various species of annual grasses, forbs, and a few species of perennial grasses (1).

Table D. 25.1. Resource Statistics, Lake Isabella.

Date of Authorization	1944 <sup>a</sup>
Rights in Land Acquired Between	1949 to 1969b
Date of Impoundment	December, 1952 <sup>C</sup>
Date of Full Operation	April, 1954 <sup>C</sup>
Lake Size When Water Level is at:	
Spillway Elevation (2,605 ft msl)	11,400 acresa
Normal Pool Elevation (2,564 ft msl)	6,520 acresa
Normal Minimum Pool Elevation (2,522 ft msl) Minimum Design Elevation	1,850 acres <sup>a</sup>
Water Fluctuation - Summer Recreation Season	42 feet <sup>a</sup>
Shoreline at Normal Pool	30 miles <sup>C</sup>
Held in Fee Simple by Corps	30 miles <sup>C</sup>
Land Area Managed by Corps	
Total Land in Project	16,000 acres <sup>C</sup>
Fee Title in U. S. 15,200 acres <sup>C</sup>	
Easements 800 acres <sup>C</sup>	
Project Operation Lands	500 acres <sup>C</sup>
Manageable Resource Lands	8,180 acres

<sup>&</sup>lt;sup>a</sup>Sacramento District. 1967. Design memorandum No. 3, Isabella Reservoir, Kern River, California, Master Plan. Sacramento, California.

<sup>&</sup>lt;sup>b</sup>Sacramento District. 1969. Realty control file summary, Isabella Reservoir. Sacramento, California.

CRRMS. 1973.

d<sub>Not available.</sub>

e Total Project Land minus (Land Flooded at Normal Pool + Project Operational Lands + Easements).

# II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

# A. Analytical Unit

Damaging stream flows are minimized or eliminated in the downstream channels of the Kern River and its distributaries to the Buena Vista and Tulare Lakebed areas. Agricultural areas which depend on the Kern River flow for irrigation extend into the San Joaquin Valley 40 mi southwest of Lake Isabella (1).

The 350 sq mi Kern River Valley area is dependent on the tourist trade associated with Lake Isabella. Within the valley, communities most affected by the lake are those that overlook the lake such as Kernville, Wofford Heights, and Lake Isabella. Communities near the lake such as Bodfish, Miracle Hot Springs, Onyx, and Waldon are economically influenced by the project.

Growth in the valley has accelerated since completion of the lake in 1954. In 1950 the area had a population of 1000 and about 10 businesses (3). Today the area has a population of about 5,900 and has approximately 350 businesses (4, 5).

The annual visitation rate from 1965 to 1972 at Lake Isabella has averaged 1.5 million visitors; 1973 visitation was 860,000 (6). It is estimated that visitors to Kern County annually spend \$50 million and that a major portion of these monies are generated in the Kern River Valley (7). Seventy-one percent of all visitors to the lake come from southern California which has a population of 10 million and includes the counties of Los Angeles, Ventura, Orange, San Bernardino, and Riverside. From this area 55% of all visitors come from Los Angeles County while Kern County accounts for 29% of the lake visitors (2, 8).

Completion of the Sherman Park Winter Sports Area and the transformation of U. S. 178 into an expressway connecting the interstate

system at Bakersfield is anticipated to boost the visitation rate and the economy of the area.

# B. Ownership

The take line used for acquiring project properties was the 2,617 ft msl contour line; however, exceptions exist as some properties were acquired above the take line. The Corps administers the lake and a narrow strip of land between the lake and the highway circumventing the lake. Approximately 13% of the 61 mi boundary has been monumented (9). The BLM administers lands contiguous to Corps properties on the southwest side of the lake. Around the rest of the lake and adjacent to Corps properties are private lands. Bordering these properties is the Sequoia National Forest which is administered by the USFS. There are no significant state or county holdings within the project area.

# C. Resource Management

#### 1. Recreation

Total investment in recreational development by the Corps since 1964 has been \$1,300,600 (10). The Corps presently operates seven class A recreational areas which occupy 218 acres. A \$2.50 fee is charged per vehicle from May through August at five of the seven sites (6, 11). Revenue derived from these fees exceeds the cost of collection (collection cost is derived by calculating the actual time spent collecting fees) (9). Facilities provided at the fee sites include picnic tables, stoves, comfort stations, running water, refuse containers, and boat launch areas. Other recreational areas are provided by the Corps but offer little in the way of facilities and are designated as day-use areas. Due to the magnitude of lake fluctuations most all recreational facilities are located on the west and southwest bank where lake levels are more stable. However, if the lake pool reaches 110,000 acre-ft (or less) lake access is restricted. This is due to extreme distances from access

areas to navigable waters and because the Borel Canal, which lies offshore from the access areas, becomes exposed creating a safety hazard to swimmers and boaters (2, 11, 12).

In 1962 the Committees on Public Works and the House of Representatives authorized the Corps to perform a feasibility study on enlarging Lake Isabella. Kern County also proposed the establishment of a 120,000 to 150,000 acre-ft minimum pool and to modify operational procedures for the lake during the recreation season (2). Instituting these proposals would reduce lake fluctuations, minimize uncontrolled shoreline use, eliminate inconvenient access, and stabilize the economy of the area by reducing recreation use patterns (2). Implementation of the proposal is dependent upon satisfying requirements for downstream water withdrawals (10).

Road access to all but one recreation area is uncontrolled and results in: (1) over-use during peak visitation periods, (2) difficulty in obtaining accurate visitation figures, (3) increased erosion and destruction of natural vegetation, and (4) inefficient enforcement of regulations.

A load factor of 3.6 is used in determining or calculating the visitation rate from traffic counter data. This figure represents the highest load factor obtained during the recreation season at the most heavily used recreation area at the project. Load factors determined during the survey ranged from 3.1 to 3.6 during the summer season and 2.0 to 2.7 during the winter season (10). Greatest percentage of activity use on the lake in 1973 was fishing (77%), camping (43%), and swimming (28%) (6). Peak periods of visitation occur in May and August and probably coincide with the spawning peak of sport fishes (11).

Three commercial marinas, which occupy 75 acres, are leased from the Corps by two concessioners (Table D.25.2). A marina is located on the south and southwest banks where lake levels insure boating access

Table D.25.2. Outgrants for Recreation -- Commercial, Lake Isabella.

			Rer	Rental		Annual		Inves	tment	
Location	Grantee	Instrument	Date Term Original (yrs) Current	Term (yrs)	Basis	Rent Paid (\$)	Acreage	To 1974 Fig. (\$)	Planned (\$)	Turnovers
Scottys Marina <sup>b</sup>	J. Scott	Lease	1971	10	Fixed + Graduated	2,945 ad	5.2	136,658	N/A	0
Kern Valley Marina	Strickland and Swartz		1571	a	Fixed + Graduated	3,027	<b>52</b>	<b>44.</b> 772	K/N	<b>-</b>
Kern Valley Golf Course	W W	Tease	1971	7.2	5% of Gross	ss 550	220	N/A	N/A	•
Totals 3	Asim	T (CP)				6,522	- S8 	181,430	2000	

Personal communication, 4 November 1974. Sacramento District, Real Estate Division, Management and Disposal Branch, Sacramento, California. b Scottys Marina operates two marinas at 23 acres and 29 acres, the 23 acre marina was purchased from Strickland and Swartz.

c Not available.

throughout the year. The third marina is located on the west bank near Wofford Heights and closes during the winter months because of low lake levels which inhibit access to the main body of the lake. Facilities provided by the marinas include boat docks and mooring spaces, baits and tackle, boat rentals, fuel and food services. All three marinas conduct their businesses on floating platforms which fluctuate with lake levels. Parking and storage areas account for the bulk of all acreage leased. Additional support for business is provided by the Corps as all marinas occupy portions of day-use facilities which are close to Corps camping areas.

The USFS, Cannell Meadow District, Kernville, administers 508,000 acres in the Sequoia National Forest. This district operates 14 camping areas which occupy 147 acres and one day-use area. Thirteen of the sites are located north of Lake Isabella along the Kern River. One campsite is located east of Lake Isabella on the South Fork Kern River. Visitation recorded for 1973 was 1.25 million and was determined by on-site counts and magnetic loop automatic counters. Fees charged for camping ranged from \$1 to \$2. All fees collected are transmitted to the U. S. Treasury which subsequently returns 25% to the county within which they were collected. Operation and maintenance of these recreation areas is the responsibility of six permanent USFS employees (12). During peak visitation periods campers who can not find a desirable location on Lake Isabella overflow into the USFS recreation areas (12).

Major problems associated with management of the USFS recreation areas are solid waste and sewage disposal, fee compliance, and enforcement of regulations (12). Additionally, there are four USFS camping areas south of Lake Isabella on the Kern River off of U. S. 178. These areas are administered by the USFS Greenhorn District in Bakersfield, CA (13).

Approximately \$250,000 has been budgeted by the State of CA, Department of Navigation and Ocean Development, for development of boating facilities at Lake Isabella. This is the only agency that is currently participating in the Corps 711 program at Lake Isabella (9). The Corps has estimated that state and local governments have invested approximately \$412,000 for capital improvements since recreation development began in 1954 (9).

In 1954, Kern County leased all Corps lands around the reservoir (except project operation land) and assumed responsibility for recreation development and management on Lake Isabella. In 1964, the county relinquished recreational responsibility for the western half of the lake. This action initiated the Corps' active development and management of recreational facilities on the lake. In 1971 the county relinquished control of recreation on the eastern half of the reservoir. Presently the county has under lease one small park, a boat inspection station, a warning light complex for boaters, and the 220 acre Kern Valley Golf Course which is subleased (Tables D.25.3 and D.25.4) (2). From 1954 to 1971 Kern County invested \$151,930 on capital improvements for recreation around the lake; since 1971 the county has invested an additional \$12,990 for capital improvements (14).

Kern County is not participating in the Corps 710 program. Reasons given by Kern County for non-participation are (1) lack of sufficient time necessary to respond to a Corps inquiry regarding the 710 program, (2) inability to recapture investments should the county decide to withdraw from the agreement after recreational development, and (3) the people in the Greater Los Angeles Area benefit more from investments at Lake Isabella than do the people of Kern County. In contrast to this situation, Kern County is participating in the Soil and Moisture Conservation program administered by the Bureau of Reclamation (BurRec) for development of Lake Woolomes. Regarding this program, the BurRec will match county improvements up to \$100,000 and has granted \$75,000 to the

Table D.25.3. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Lake Isabella. a

Grantee	Instrument	Rental	Term (yrs)	Annual Rent Paid (\$)	Acreage	Investment to 1974 Plann (\$) (\$)	Planned (\$)	
Kern Co., California	Lease	1971	10	O	26	12,990 <sup>b</sup>	N/B	

e Personal communication, 4 November 1974, Sacramento District, Real Estate Division, Management and Disposal Branch, Sacramento, California.

Dersonal communication, 8 November 1974. Kern County, Department of Parks and Recreation. Bakersfield, California.

Outgrants for Agriculture and Grazing, Rights-of-Way, and Miscellaneous Purposes, Lake Isabella. a Table D.25.4.

				Rental	tal			Inve	stment
Purpose	Grantee	Outgrants	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	to 1974 Plans (\$) (\$)	Planned (\$)
Rights-of-Way	Summary	26	Easements, Licenses, Consent	1	Тегш	225	238.0	N/A	N/A
Others	Summary	E	Lease and	1	Term	155	0.5	N/A	N/A
Trap Shoot and Rifle Range	Kernville Lions Club		Lease	1971	s	Fixed + & gross	0.06	N/A	N/A
Agricultural and Grazing	Rudnick Estates Trust		Lease	1973	8	1,958	1,000.0	N/A	N/A
Agricultural and	W. Kissack		Lease	1974	4.5	10,833	751.0	N/A	N/A
Grazing	W. Kissack	•	Lease	1973	5	2,161	0.618	N/A	N/A
Agricultural and	W. Jonghin	1	Lease	1974	s	20	40.0	N/A	N/A
Grazing	W. Jonghin	1	Lease	1973	s	1,867	1,241.0	N/A	N/A
	W. Jonghin	1.	Lease	1974	9	225	225.0	N/A	N/A
Agricultural and Grazing	A. W. Petersen	•	Lease	1973	s	787	197.0	N/A	N/A
Agricultural and Grazing	A. Brown	•	Lease	1974	4.5	528	251.0	N/A	N/A
Totals 38						18,858	4,852.5	N/A	N/A

\*Personal communication, 4 November 1974. Sacramento District, Real Estate Division, Management and Disposal Branch, Sacramento, California.

bNot available.

county over a 5-year period. Additionally Kern County looks on Lake Woolomes as an attraction that will serve visitors from outside of the county (15).

Three quasi-public recreation areas, which occupy 27 acres, are permitted to the U.S. Air Force (Table D.25.5) (15). These areas are fenced and are occupied by numerous mobile homes of various sizes and ages. They are easily visible from primary roadways and present an unkempt appearance. Additionally a KOA Campground is located adjacent to Corps land on the south side of the reservoir. During the peak recreation season the KOA receives overflow visitation from the Corps recreational area.

### 2. Lake Resources

The California State Department of Water Resources monitors the chemical quality of outflow from Lake Isabella on a semiannual basis. The Corps monitors outflow temperatures on a weekly basis (16). Release waters currently meet water quality standards of the state for the Kern River and are expected to continue to meet these standards (16).

Water fluctuations on the lake are large and pose fishing resource problems (18). In April, the lake is approximately 2,522 ft msl (30,000 acre-ft) and is receiving runoff water from snow melt. Consequently, from April to June or July the lake may rise 83.5 ft. At the end of this period the lake begins to recede as releases are made for flood control and irrigation purposes. This action continues until September when the lake level has dropped back to the April elevation (2).

Lake Isabella supports one of the finest warm water fisheries in California. Principal game fish include white crappie, black crappie, largemouth bass, bluegill, brown bullhead, white catfish, rainbow trout, and brown trout.

Warm water fish were stocked upon completion of the lake and are now self sustaining. Trout are maintained in the lake by their movement

Outgrants for Recreation -- Quasi-Public, Lake Isabella. Table D, 25.5.

				Rental					
	Grantee	Instrument	Date	Term (yrs)	Basis	Current Annual Rent (\$)	Acreage	to 1974 (\$)	Planned (\$)
	U.S. Air Force	Permit	1973	5	0	0	19	N/A b	N/A
	U.S. Air Force	Permit	1970	2	•	0	7	N/A	N/A
	U.S. Air Force	Permit	1970	5	•	0	2	N/A	N/A
						ı	1	1	1
Totals						0	23	N/A	N/A

California de la constanta de Sacramento, Branch, Disposal and Management a e Division, and a second secon Estate State of the Committee of the State District the Law Self-Ton to account the Late commence State and the consequence of the state of the nga sebaga 🍓 di da kebabatung padi budi 2000 padi savat man .**0** November 1 Personal communication,

Not available.

from upstream areas and stocking which supplements natural reproduction is performed by the California Department of Fish and Game (CDFG) (2).

Downstream flows are adequate because an agreement between the CDFG and downstream users require a maintenance flow in the Kern River between Lake Isabella and the point downstream where water from the Borel power plant is returned to the Kern River (2).

Fishery problems associated with the lake are: (1) insufficient cover for growth of juvenile fish, (2) extreme winter drawdowns resulting in fish kills, (3) large fluctuations in lake levels which prevents effective manipulation of the shoreline for spawning (17).

The USF&WS recommended (1) the Corps make provision for periodic evaluation of the fishery and to implement any corrective resource management measures deemed necessary to insure high fishery values, (2) development and implementation of any program for fishery management be coordinated between the CDFG and USF&WS. Corrective fishery management measures put forth by the USF&WS included: (1) vegetation retention along the shoreline and areas that are periodically submerged, (2) providing fish shelters, (3) rough fish controls, (4) maintenance of stable lake levels during the major fish spawning period (April 1 to June 30) (1). These recommendations were incorporated into the Corps 1967 Master Plan. However, only the last recommendation has been implemented.

## 3. Wildlife

Game species around the reservoir include a small herd of mule deer, the Mourning Dove (moderate numbers), California Quail, Chukar, and cottontail rabbit. Waterfowl, such as the Mallard and Cinnamon Teal, nest around the lake, while the Canvasback and Redhead utilize the reservoir during migratory periods. Other wildlife include the raccoon, opossum, bobcat, coyote, badger, gray fox, weasel, and skunk and a variety

of nongame birds (1). Hunting is not intensive but is allowed on about 10% of the Corps land in areas designated by Kern County.

In 1956 the USF&WS indicated that 3,730 acres of lands were suitable for wildlife management. This acreage is located on the east side of the lake and is bisected by the South Fork Kern River. The USF&WS stated that development of this wildlife area would require minimizing livestock grazing and agricultural practices. Once these controls were implemented natural vegetation would be allowed to recover and food plots and cover vegetation would be established. The USF&WS feels that such development would increase upland game bird populations and benefit waterfowl (1). In 1967 the Corps designated 3,400 acres of the area described by the USF&WS as a proposed wildlife area that would ultimately be developed (1). To date the Corps has not instituted development but continues to lease these properties for grazing and agricultural purposes (18).

#### 4. Other Land Use

## (a) Agricultural and Grazing

Agricultural and grazing lands leased from the Corps occupy 4,260 acres. These lands are located on the east side of the lake and are bisected by the South Fork Kern River. These properties are regularly or irregularly inundated. Of the 4,260 acres leased, 3,257 acres are outgranted to the original land owners who have the first right for lease renewal.

## (b) Development

Adjacent to Corps properties are a number of private holdings. These properties lie vacant and unfenced which protude into the narrow belt of project lands, separating one parcel of Corps property from another. This division of Corps lands renders management difficult. Consequently visitors to the lake utilize private properties for camping and offroad vehicles (10). The Corps has flowage easements over some of these properties which restrict development. Other undeveloped properties

contiguous to Corps lands have declined in value (from \$2,000 per acre to \$400 to \$500 per acre) due to the development costs required to control domestic wastes and runoff to meet requirements deemed necessary by the State of CA (20).

County Airport 13 is operated by Kern County and is leased from the Corps. The airport is located on the northeast bank of the reservoir and is situated below the spillway elevation resulting in periodic inundation.

A minor concession which occupies 90 acres on the northeast side of the lake is leased to the Kernville Lions Club which operates a trap shoot and a pistol and rifle range (Table D.25.4). Other land uses relating to rights of ways are shown on Table D.25.4. A summary of Corps outgrants is shown on Table D.25.6.

The area around Lake Isabella contains a number of aboriginal sites. They are indicated by organic refuse, chips of obsidian and chert, artifacts and large boulders with mortar pits ground in them. Historically, Kernville was founded during the 1855 gold rush and was known as "Whiskey Flats" (1).

# 5. Resource Use Controls

At the district level, the Environmental Planning, Project Operations, and Management and Disposal Sections are directly responsible for recreation and resource management at Lake Isabella. Each section is under a separate division, resulting in segregated activities which may conflict with each other or may conflict at the project level. Recommendations originating from each section must pass through "layers" of supervisory civil engineers which are less than adequately trained to evaluate resource management proposals (Figure D.25.2).

Table D.25.6.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to
Recreation - Public Parks		0	26	12,990
Recreation - Quasi-Public	3	0	23	N/Aª
Recreation - Commercial	3	6,522	295	181,430
Rights-of-Way, Agricultural and Grazing, Rifle Range, and Miscellaneous	<b>%</b>	18,858	4,853	N/A
Totals	45	25,380	5,196	194,420

a Not available.

GS-13 68-11 68-11 68-1 68-4 GS-13 GS-12 GS-14 Management Disposal Branch Planning & Control Branch Real Estate Division Acquisition Branch Supv Realty Spec Supv Realty Spec Appraisal Branch Supv Realty Spec Realty Spec 1 Mgmt Agron 1 Realty Spec 1 Realty Spec 1 Realty Clerk Realty Officer Supv Appr Figure D.25.2. Recreation-Resources Management Interrelationships - Sacramento District. GS-12 GS-11 GS-11 GS-7 GS-7 GS-14 GS-13 GS-15 CS-7 Isabella Lake Area Field Office Construction-Operatons Division Project Operations Section DISTRICT ENGINEER Supv Civil Eng
1 Outdoor Rec Plnr
1 Electronic Tech
1 Park Ranger
1 Equip Spec
1 Laborer (Temp) Construction Branch Operations Branch Service Branch Supv Gen Clerk Supv Civil Eng Supv Civil Eng Supv Civil Eng GS-13 GS-12 GS-11 GS-11 GS-11 GS-9 GS-7 L Temp) GS-7 GS-6 GS-6 GS-5 GS-5 GS-14 GS-15 Water Resources Planning Branch Environmental Planning Section Supv Environ Res Plnr
2 Environ Res Plnr
1 Math Stat
1 Civil Eng
2 Environ Res Plnr
2 Environ Res Plnr
1 Environ Res Plnr
1 Environ Res Plnr
1 Environ Res Plnr
1 Eng Draftsman
2 Outdoor Rec Plnr (1 Te
1 Civil Eng Tech
1 Environ Res Plnr
1 Civil Eng Tech
1 Civil Eng Tech Engineering Division Supv Civil Eng Supv Civil Eng

GS-11 GS-9

Disposal Section

Realty Spec 1 Realty Spec

D.25.19

At the project level the Project/Park Manager is a GS-11 who has been promoted through the ranks. At present, Project/Park Managers are not required to have any formal training or education. All rangers working under the park manager are required to be formally educated in the natural or social sciences with preference given to applicants trained in recreation and resource management (9).

The primary activities of Park Rangers include patrolling recreation areas, visitor control, and inspection of lands and structures outgranted by the Corps. The Rangers also patrol project lands to detect encroachments, fires, unauthorized use or construction, vandalism, and pollution problems. In about 12 instances, contiguous private residential landowners have incorporated Corps lands into their yards. Enforcement procedures apparently have not been instituted at the project or district level to corrent these violations (11).

Corps rangers have little opportunity for promotion beyond a GS-9 within the Sacramento District. Therefore park and resource management professionals in this district leave the Corps after gaining a few years experience (9).

Enforcement of Corps regulations by project personnel has not been aggressive. Management personnel now feel that the rangers have acquired sufficient experience to implement an effective enforcement program (9). Project personnel feel that more adequate enforcement would drastically reduce problems associated with off-road vehicles and overcrowded areas (11).

Kern County is responsible for boat inspection and boating safety on the lake. In this respect they operate a boat inspection station, and a warning light system which warns boaters of dangerous wind conditions on the lake.

#### III. KEY FINDINGS

## A. Recreation

- 1. In 1954, Kern County assumed responsibility for recreation management and development on properties leased from the Corps. In 1964, the county withdrew from its lease agreement on the western half of the reservoir. In 1971, (except for the operation and maintenance of one small park, a boat inspection station, and a warning-light complex) the county withdrew from its lease agreement on the eastern half of the reservoir.
- 2. Fluctuations in pool levels inhibit water-oriented recreational activities. The Corps is considering a proposal to increase the minimum recreation pool from 30,000 acre-ft (present volume) to 120,000 acre-ft to provide a larger and stabler recreation pool. Implementation of the proposal is dependent upon satisfying requirements for downstream water withdrawals.
- 3. Road access to all but one recreation area is uncontrolled and results in: (1) over-use during peak visitation periods, (2) difficulty in obtaining accurate visitation figures, (3) increased erosion and destruction of natural vegetation, and (4) inefficient enforcement of regulations.
- 4. Reasons for the lack of local government response to costsharing opportunities under the 710 program are: (1) lack of monies and
  (2) inadequate time for local government personnel to prepare expressions
  of interest.
- 5. Revenue derived from camping fees exceeds the cost of collection (collection costs are derived by calculating the actual time spent collecting fees).
- During peak visitation periods, overflow visitors extend into
   USFS recreation areas along the Kern River and a KOA Campground contiguous
   with project land.

- 7. Between 1965 and 1972, annual visitation has averaged 1.5 million; 1973 visitation was 860,000. Approximately 55% of all visitors come from Los Angeles County. The economy of the Kern River Valley is totally dependent on the tourist trade associated with Lake Isabella. Completion of the expressway connecting Lake Isabella with the interstate system at Bakersfield is expected to increase visitation and further boost the Kern River Valley economy.
- 8. Enforcement of Corps regulations by project personnel has not been aggressive. Management personnel now feel that the rangers have acquired sufficient experience to implement an effective enforcement program. Project personnel feel that more adequate enforcement would drastically reduce problems associated with off-road vehicles and over-crowded areas.

# B. Fish and Wildlife

- Lake Isabella is one of the most productive bodies of water in CA for warm water fishes. Fishing is the major attraction at Lake Isabella.
- 2. The Corps Design Memorandum No. 3 (1967) recognizes fish and wildlife needs as: (1) maintaining the pool level as stable as possible during the spawning season from March to June, (2) establishing fish shelters, and (3) establishing a 3,400 acre wildlife management area to provide an area for hunting and field-dog trials. Only the first of these needs has been met. During the winter months extreme drawdowns have caused fish kills.
- Small game hunting is allowed around the reservoir in areas designated by Kern County, but hunting is not intensive.
- 4. At the project level, a program is underway (in cooperation with a youth organization) to build and establish wood duck boxes on the east side of the lake.

# C. Corps and Contiguous Land Use

- 1. Since impoundment of the Kern River, the surrounding communities have changed from a rural agricultural economy with a population of approximately 1,000 to a recreational and tourist based economy with a population of 5,900. Land values have increased, second homes have been established, and the population of retired residents has increased as a result of lake construction and development.
- 2. Approximately 13% of the boundary has been monumented. In about 12 instances, contiguous private residential landowners have incorporated Corps lands into their yards. Enforcement procedures apparently have not been instituted at the project or district level to correct these violations.
- 3. The California Department of Navigation and Ocean Development, the only agency presently involved in the Corps cost-sharing program, has budgeted monies to develop boating facilities at Lake Isabella. The governor's office has directed state agencies to coordinate with the Corps for future development at Lake Isabella and other Corps lakes.
- 4. Kern County does not participate in the Corps 710 program because they feel investment in permanent facilities could not be recaptured if the county later decided to withdraw from the program. However, Kern County is participating in a cost-sharing and matching-fund program with the BurRec for recreational development at Lake Woolomes.

# D. Real Estate Programs and Practices

1. The lands initially acquired for project purposes were those lands deemed necessary for flood control. Lands were not specifically acquired for recreational and fish and wildlife purposes.

2. While the Corps has recognized that a wildlife management program could be performed over approximately 3,400 acres, it has not acted to initiate such a program but continues to lease properties designated as proposed wildlife areas.

## E. Corps Organization

- 1. At the project level the Project/Park Manager is a GS-11 who has been promoted through the ranks. At present, Project/Park Manager's are not required to have any formal training or education. All rangers working under him are required to be formally educated in the natural or social sciences with preference given to applicants trained in recreation and resource management.
- Compared to the Corps, the USFS's Cannell Meadows District has half the permanent staff, twice as many developed facilities, a comparable visitation rate, yet issues about twice as many citations.
   Additionally, the USFS district recreation areas are adequately maintained.

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# 26. TABLE ROCK DAM AND RESERVOIR Southwestern Division Little Rock District Missouri and Arkansas

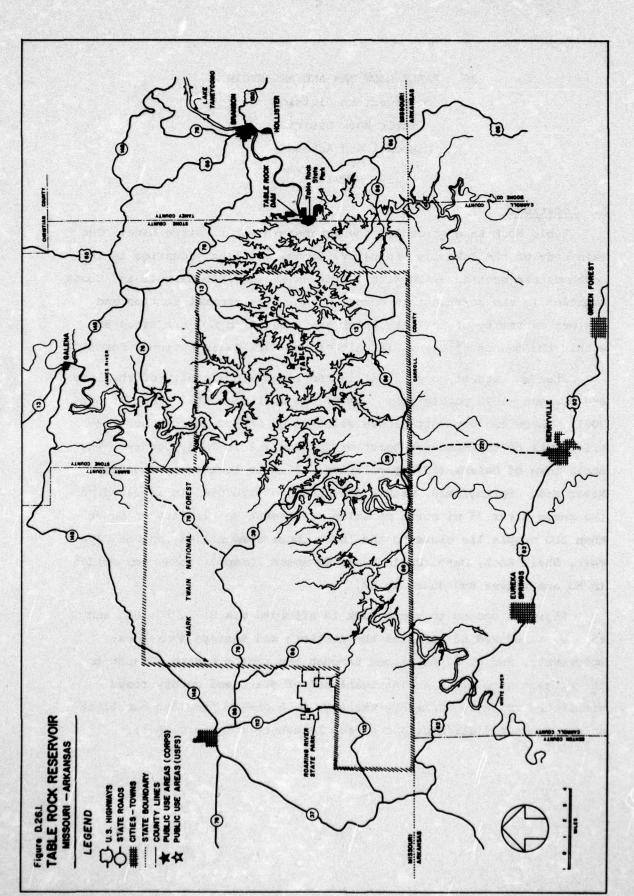
## I. SETTING

## A. Location

Table Rock Lake straddles the Arkansas-Missouri State Line. The main body of the lake lies in Barry, Stone, and Taney Counties in the southwestern section of MO with 3 arms extending into Carroll and Boone Counties in the northwestern corner of AR. The central section and western extremity of the lake which are located in MO, are situated within the bounds of Cassville unit of the Mark Twain National Forest.

The two largest communities in the immediate vicinity of the lake are Branson (1970 population: 2,175) and Hollister (1970 population: 906). These two communities are situated on Lake Taneycomo about 7 miles (mi) to the east-northeast of the damsite in Taney County. The small town of Galena (1970 population: 391) is located on the James River arm. Springfield, with a population of 120,096, is situated on the James River 35 mi north of Galena. Several settlements of fewer than 300 people lie close to the lake; these communities include Cape Fair, Shell Knob, Mano, Eagle Rock, Thompson, Lampe, Viola, and Golden in MO and Beaver and Busch in AR.

Regional access to Table Rock is afforded via U. S. 60, 62, and 65. U. S. 62 and 65 parallel the southern and eastern shores respectively, and U. S. 60 passes through the region coming closest to the project at Busch. An intricate net of state and county roads within the triangle formed by these U. S. highways provides excellent access to nearly all sections of the lakeshore (Figure D.26.1).



# B. Authorization and Purposes

Table Rock Dam and Reservoir were authorized by the Flood Control Act of 1938 (PL 75-761), as modified by the Flood Control Act of 1941 (PL 77-228). The project was originally authorized for flood control and generation of hydroelectric power.

## C. Features

Table Rock Dam and Reservoir is one in a chain of four projects on the White River. Upstream is Beaver Lake, and downstream are Lake Taneycomo and Bull Shoals. Norfork Lake, situated on a tributary which flows into the White River, straddles the state line to the east.

The shoreline is 745 mi long at normal pool increasing to 857 mi at flood control pool. The lake floods the dendritic valleys of several streams (the White, King, and James Rivers) and about 40 small-to medium-sized creeks. The shoreline is highly irregular and serpentine in shape.

There are no islands of significant size. The shores consist of very high bluffs in many places, and topography is moderate to steep elsewhere.

The waters of Table Rock Lake are clear and very deep reaching 252 feet (ft) above the streambed at the dam. The lake contains many large trees which were not removed prior to flooding and which present a navigation hazard during periods of low water levels. Private development in many cases is very close to the shoreline.

The conservation pool is kept at 915 feet above mean sea level (ft msl), although fluctuations of up to 12 ft do occur during the recreation season (Table D.26.1).

The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Corps has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

Table D.26.1. Resource Statistics, Table Rock Dam and Reservoir. a

Date of Authorization		1941
Rights in Land Acquired Between		1953-1960
Date of Impoundment		November, 1958
Date of Full Operation		May, 1960
Lake Size When Water Level is at:		
Spillway Elevation (931 ft msl)		52,300 acres
Normal Pool Elevation (915 ft m	msl)	43,100 acres
Minimum Design (846 msl)		16,300 acres <sup>b</sup>
Water Fluctuation - Summer Recreati Season	ion	12 ft
Shoreline at Normal Pool	of color than	745 miles
Held in Fee Simple by Corps		745 miles
Land Area Managed by Corps		
Total Land in Project		60,694 acres
Fee Title In U. S.	57,745 acres	
Easements to Flood	2,949 acres	and the state of the
Project Operation Lands		340 acres
Manageable Resource Lands		14,305 acres <sup>c</sup>

Personal communication, October 1974 - January 1975. Little Rock District, Real Estate Division, Management and Disposal Branch, Little Rock, Arkansas.

bBottom of power pool.

CTotal project land minus (land flooded at normal pool + project operation lands + easements).

# II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

## A. Analytical Unit

The analytical unit is roughly delineated by an intricate system of highways and political boundaries. The line of delimitation to the east and north is U. S. 65 and MO 265, 76, and 248. To the west the delineation follows MO 173, 76, and 39, and Barry M and F. South of the project the line follows AR 23, the AR-MO State Line, and AR 14. Beyond the analytical unit, land uses have little or no effect upon the project. On the other hand, the effects of the project upon the region can be seen for many miles beyond the analytical unit in the form of: bait and tackle shops; boating sales, supplies, and service; restaurants and gift shops; and motels and resorts along highways radiating from the project (Figure D.26.1).

# B. Ownership

## 1. Corps

The project area at Table Rock includes 60,694 acres. The Corps holds 57,745 acres in fee simple and 2,949 acres in flowage easements. The largest Corps-owned parcel is situated at the damsite. This parcel includes 340 acres for dam operation and hydroelectric power production. Project lands were acquired up to the 939 ft msl isoline. Of the 900+ mi of property line, 396.6 mi (44%) have been contracted for monumentation since efforts were begun in 1968. Less than 20% of the work, however, has currently been completed (1, 2). The average depth of land between the normal pool shoreline and the Corps property line is less than 100 ft.

## 2. Other Federal Agencies

The USFS's Cassville District of the Mark Twain National Forest is situated in southwestern MO. All of Table Rock Lake lying within Barry County is surrounded by the checkerboard property pattern within the forest boundary. In the westernmost part of Stone County,

a substantial portion of the lake also lies within the NF. The James River Arm from Cape Fair north, the main pool extending east from Indian Point Recreation Area, and all parts of the lake in AR, lie beyond the NF boundary.

## 3. State Government

Neither MO nor AR owns land at Table Rock Lake. The closest state property is situated at Roaring River State Park in Barry County, MO. This facility is about 3 mi from Eagle Rock which abuts Corps property located on the Roaring River Arm of Table Rock Lake.

## 4. Private

Virtually all of the land lying contiguous to Corps property at the 936 ft msl isoline is held by the private sector. Most development can be considered residential in nature, consisting primarily of second and retirement homes situated in 278 subdivisions.

## C. Resource Management

# 1. Recreation

## a. Corps

The Corps operates 19 public use areas at Table Rock Lake. Twelve of these were leased to local units of government for development, maintenance, and operation after dam completion in August 1958. Facilities at these "public access areas" were designed for local day use and to accommodate commercial marina operations. All non-commercial facilities were installed by the Corps at federal expense. It was expected that municipal and county governments would be able to sublease commercial sites to concessioners who would operate the area. Rent income would help defray the cost of maintaining the facilities. As the magnitude and character of use and the composition of governing boards changed municipal and county governing boards found that they were unable to finance qualified personnel and equipment to

manage and maintain the recreation areas properly. Hence, in 1968 all leases were terminated. In 1973, the Corps called together the mayors and county judges in the Table Rock vicinity to discuss the local operation of park facilities in their respective areas. District and project personnel were responding to OCE directives describing changes to bring the Code 710 program into conformance with the cost-sharing principals of PL 89-72. Corps officials hoped that newly authorized authority to equally share the cost of expanding and improving facilities would encourage the local governments to again operate and maintain the recreation areas. There was no positive response to the Corps' proposal. The group decided that the Corps can do the best job of running the recreation facilities (3).

The 19 Corps park sites are well designed. Eighteen sites have public launching ramps. Each has a public picnic ground, campgrounds, drinking water and comfort stations. Some have concessioner operated cafes or snack bars, full service marinas, concrete swim beaches, automated laundries, change houses, group shelters, showers, trailer dump stations, and electrical hookups. A summary of visitation statistics for Table Rock Lake is presented in Table D.26.2.

The largest of the Corps parks have manned gates. Eight are manned by retirees or retired couples employed through personal services contracts. These people do not collect money: fees are submitted prior to entrance by placing \$2 in a brown envelope and inserting it into a slotted box. This process is used to meet Corps regulations which are interpreted as preventing fee collection by other than uniformed, salaried Corps personnel. Five campgrounds are manned by temporary Corps employees who collect fees and six of the parks are not manned at all. These facilities are visited by roving fee collectors. It is estimated that \$80,000 was collected during 1974

Table D.26.2. Summary of Visitation Data for Table Rock Dam and Reservoir.

Table D.26.2. Summary of Visitation D	ata for Table Rock	Dam and Reservoi
Total Recreation Days atb		
Parks Maintained by Corps of Enginee	rs 1,585,537	
Parks Maintained by Other Agencies	362,528	
Dam, Appurtenant Works, Overlook, Powerhouse, etc.	753,659	
Unimproved Access Points	3,053,066	
TO	TAL	5,754,790
Total Activity Days <sup>C</sup>		
Fishing from Rental Boats	142,571	
Fishing from Private Boats	2,138,559	
Fishing from Bank	570,282	
ro	TAL FISHING	2,851,412
Hunting		
Hunting Upland Game	68,756	
Hunting Waterfowl	8,066	
TO	TAL HUNTING	76,822
Boating - Total number of activity days		884,576
Water Skiing - Total number of activity days		428,332
Swimming - Total number of activity days		1,468,173
Picnicking - Total number of activity	days	454,824
Sightseeing - Total number of activity	days	1,601,950
Other - Total number of activity days		308,214
Camping - Total number of activity days	5	664,660
TOTAL ACTIVITY DAYS - ALL ACTIVIT	IES	8,738,963

<sup>&</sup>lt;sup>a</sup>Little Rock District. 1973. Summary of statistical data, Table Rock Lake. Table Rock Dam and Reservoir, Branson, Missouri.

Recreation Day: A standard unit of use consisting of a visit by one individual to a recreation site or a area for recreation purposes during all or any reasonable portion of a 24-hour period.

Table D.26.2 (Continued)

Cactivity Day: A measure of recreation use by one person on one facility or area for one day or part of a day. One person may exert more than one activity day per day. The activity day is probably most useful for apportioning total use to single uses and for sizing various parts of a given recreation development.

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which is higher than that collected in the previous 2-3 years (1).

Corps campgrounds have been occupied an average of 150% of design capacity on summer holiday weekends. On some weekends, the load has reached 200%. Signs of physical site deterioration are beginning to appear as some plant species are dying because of root zone compaction. The large number of campers also overload the parks' internal road systems and sanitation facilities. Corps rangers are called upon to resolve altercations and maintain order. During periods of extreme over-use, congestion is great, policing is a problem, sanitation problems develop, and staff effectiveness decreases substantially (1).

The design of the campgrounds does permit blocking access and the number of camping parties could be limited to the number of designated campsites but district policy does not authorize such closing.

Physical deterioration appears greater than that caused by visitor overuse. Many trees were killed during the extended flood of 1973 and others have become diseased. To correct the situation, the MDC has prepared and is implementing a Recreational Forest and Vegetation Management Plan. Dead trees are removed, damaged trees are repaired, and new trees (some mature specimens with balled roots) that are more flood and compaction resistant are planted (4). Care is also exercised to use species that yield mast. All costs incurred by the MDC are fully reimbursed by the Corps.

The plan was approved in July 1973 and operations began in fall 1973. In the first year more than 100 acres have been treated. It is expected that the program will progressively treat all Corps public use areas.

Until recent years, camping squatters were a problem at parks. Some campers moved in for periods as long as 90 days using Corps public

use areas as summer resorts. A \$1 fee was established several years ago but this did not alleviate the problem. When a \$2 fee and 14-day limit were imposed, the problem began to subside. Corps policy had to be amended further last year, however, to ensure that campers would not move from one site to another after the 14-day limit was reached. New stipulations requiring campers to leave the campgrounds completely for at least 24 hour periods prior to returning were instituted. This new policy appears to have solved camper squatter problems (1).

Twelve of the Corps public use areas have commercial dock concessions leased by the Corps. These include rental slips, launching service, boats for rent, motors for rent, and service and repair of boating equipment (Table D.26.3). The impact of attendant land uses outside Corps public use areas has not been severe. It is believed that commercial concessions in most Corps parks which sell groceries, bait, tackle, and other items to campers, fishermen, and picnickers is a reason for the light impact (5).

The private campground construction boom at Table Rock Lake may be a solution to over-crowded conditions at Corps public use areas. There are now several hundred developed campsites available at commercial establishments. The MDPR will capitalize on this new supply of campsites. Beginning in 1975 officers at Table Rock State Park will turn away campers when facilities are filled and suggest the use of alternate public or private campsites in the general vicinity. The Corps is not considering a comparable policy (1, 3).

# b. U. S. Forest Service

The USFS owns and operates two parks at Table Rock Lake.

The Shell Knob facility has picnic grounds, a campground, drinking water, and a comfort station. Also included at the site is a public

Table D.26.3. Outgrants for Recreation - Commercial, Table Rock Dam and Reservoir. a

Term Basis Rent Paid (\$) (\$) (\$) (\$)  15 Fixed + 1,767 5.9 164,460 NA  21½ Fixed + 644 3.4 101,000 NA  19½ Fixed + 644 3.4 101,000 NA  20½ Fixed + 4,130 10.0 674,100 NA  18³/4 Fixed + 2,617 4.4 274,330 NA  18³/4 Fixed + 400 3.5 70,000 NA  18³/4 Fixed 500 4.2 70,750 NA  18³/4 Fixed 500 4.2 70,750 NA  18³/4 Fixed 100 .2 1,000 NA  5 Fixed 100 .2 1,000 NA  19³/4 Fixed 100 NA	Location	Grantee	Instrument		Rental		Annual	Acreage		Investment	Turnovers
Baxter Boat   Lease   1970   15   Fixed + 1,767   5.9   164,460   Nh     Bay M Dock & Lease   1970   214   Fixed   500   5.5   74,000   Nh     Raina, Inc.   Lease   1970   194   Fixed   500   5.5   74,000   Nh     Raina, Inc.   Lease   1970   194   Fixed   644   3.4   101,000   Nh     Backet, & Shoemocker   Lease   1970   18 <sup>3</sup> / <sub>4</sub>   Fixed   620   6.0   78,105   Nh     Chas. Ryter   Lease   1970   204   Fixed   4,130   10.0   674,100   Nh     Allendale   Ray Reed   1970   18 <sup>3</sup> / <sub>4</sub>   Fixed   4,130   10.0   674,100   Nh     Aller Prises, Inc.   Lease   1970   16 <sup>3</sup> / <sub>4</sub>   Fixed   400   3.5   70,000   Nh     Anderson   Lease   1970   18 <sup>3</sup> / <sub>4</sub>   Fixed   400   3.5   70,000   Nh     J. A. Sampson   Lease   1970   16 <sup>3</sup> / <sub>4</sub>   Fixed   500   4.2   70,750   Nh     J. A. Sampson   Lease   1970   16 <sup>3</sup> / <sub>4</sub>   Fixed   100   .2   1,000   Nh     J. A. Sampson   Lease   1970   16 <sup>3</sup> / <sub>4</sub>   Fixed   100   .2   1,000   Nh     J. A. Sampson   Lease   1970   194   Fixed   100   .2   1,000   Nh     Boat Dock, Inc.   Lease   1970   194   Fixed   1,643   4.6   115,800   Nh     Boat Dock, Inc.   Ray   Rains   Rains				Date		Basis	Ren		to 1974 (\$)	Planned (\$)	
Big W Dock & Lease   1970   21½   Fixed   500   5.5   74,000   NA     Packett, &	Baxter	Baxter Boat Dock, Inc.	Lease	1970	15	Fixed +		5.9	164,460	NA	0
Fair Flood,  Packett, & Stood  Backett, & Stood  Stoomocker  et Ray Reed  Chas. Ryter  Chas. Ryter  Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 300 3.0 55,000 NA  R. P. Powers  R. P. Powers  R. P. Powers  R. P. Powers  R. P. S. J. K.  Allendale  Anderson  J. A. Sampson  Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 4,130 10.0 674,100 NA  Anderson  J. A. Sampson  Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 400 3.5 70,000 NA  Anderson  J. A. Sampson  J. A. Sampson  Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 500 4.2 70,750 NA  Makeland  J. A. Sampson  J. A. Sampson  Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 500 4.2 1,000 NA  J. A. Sampson	Big M	Big M Dock & Marina, Inc.	Lease	1970	211%	Fixed	200	5.5	74,000	Ą	• • • • • • • • • • • • • • • • • • •
chas. Ryter Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 300 3.0 55,000 NA  Chas. Ryter Lease 1970 204 Fixed 4,130 10.0 674,100 NA  R. P. Powers Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 4,130 10.0 674,100 NA  R. A. & J. K.  Anderson Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 400 3.5 70,000 NA  J. A. & J. L.  Wakeland Lease 1970 18 <sup>3</sup> / <sub>4</sub> Fixed 500 4.2 70,750 NA  J. A. Sampson Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 340 8 57,000 NA  J. A. Sampson Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 340 8 57,000 NA  J. A. Sampson Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 100 .2 1,000 NA  J. A. Sampson Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 100 NA  Boat Dock, Inc.  * gross  * gross  * gross  * gross  * gross  * gross  * Na  * gross  * Na  * S. Chamberlain Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 100 NA  * gross	Cape Fair	Flood, Packett, & Shoemocker	Lease	1970	194			3.4	101,000	<b>X</b>	0 5 6 u
Chas. Ryter   Lease   1970   204   Fixed + 620   6.0   78,105   NA     R. P. Reed   R. P. Reed   1970   18 <sup>1</sup> / <sub>6</sub>   Fixed + 4,130   10.0   674,100   NA     Allendale   1970   16 <sup>3</sup> / <sub>4</sub>   Fixed + 2,617   4.4   274,330   NA     R. A. & J. K.   Lease   1970   18 <sup>4</sup> / <sub>7</sub>   Fixed   400   3.5   70,000   NA     J. A. & J. L.   Lease   1970   18 <sup>3</sup> / <sub>4</sub>   Fixed   500   4.2   70,750   NA     J. A. Sampson   Lease   1970   16 <sup>3</sup> / <sub>4</sub>   Fixed   340   8   57,000   NA     ide	ricket reek	Ray Reed	Tease On the Control of the Control	1970	18 <sup>3</sup> /4		300	3.0	25,000	N.	<b>7</b>
Allendale  R. P. Powers  R. P. Powers  In Allendale  R. A. & J. K.  J. A. & J. K.  J. A. & J. L.  J. A. & J. L.  J. A. Sampson	sagle sock	Chas. Ryter	Lease	1970	204	Fixed + & gross		6.0	78,105	NA NA	<b>-1</b>
### Allendale  ###################################	lighway 13	E. P. Reed R. P. Powers	Lease	1970	181/6	Fixed +		10.0	674,100	NA	•
R. A. & J. K. Anderson Lease 1970 18½ Fixed 400 3.5 70,000 NA  J. A. Sampson Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 500 4.2 70,750 NA  ide  way S. Chamberlain Lease 1970 5 Fixed 100 .2 1,000 NA  a ell Campbell Point Lease 1970 19½ Fixed + 1,643 4.6 115,800 NA  gross	indian	Allendale Enterprises, In		1970	163/4			4.4	274,330	NA	<b></b>
J. A. & J. L.  Wakeland  J. A. Sampson  J. A. Samps	ong	R. A. & J. K. Anderson	Lease	1970	183	* gross Fixed		3.5	70,000	МA	0
J. A. Sampson Lease 1970 16 <sup>3</sup> / <sub>4</sub> Fixed 340 8 57,000 NA S. Chamberlain Lease 1970 5 Fixed 100 .2 1,000 NA Campbell Point Lease 1970 194 Fixed + 1,643 4.6 115,800 NA 8 gross	'iola	J. A. & J. L. Wakeland	Lease	1970	18 <sup>3</sup> / <sub>4</sub>	Fixed	200	4.2	70,750	N.	0
S. Chamberlain Lease. 1970 5 Fixed 100 .2 1,000 NA  Campbell Point Lease 1970 194 Fixed + 1,643 4.6 115,800 NA  Boat Dock, Inc.	ndian oint akeside	J. A. Sampson	Lease	1970	16 <sup>3</sup> / <sub>4</sub>	Fixed	340	<b>o</b>	57,000	<b>K</b>	0
Campbell Point Lease 1970 19% Fixed + 1,643 4.6 115,800 NA Boat Dock, Inc.	lideaway	S. Chamberlain		1970	ĸ	Fixed	100	۲.	1,000	NA A	0
	Campbell Point	Campbell Point Boat Dock, Inc.		1970	194	Fixed + & gross		4.6	115,800	NA N	0

Table D.26.3 (Continued)

Location	Grantee	Instrument		Rental	Part of	Annual	Acreage	Inves	tment	Turnovers
			Date	Term (yrs)	Bas	is Rent Paid (\$)	44 35	to 1974 (\$)	Planned (\$)	to 1974 Planned (\$) (\$)
Indian Point Marina	Indian Point Landing Marina	Lease	1970	215/6	1970 21 <sup>5</sup> / <sub>6</sub> Fixed + 2,610 * gross	2,610	6.6	82,700	N/A	-
Totals		   E1				16,171	68.6 1,	68.6 1,818,245		

Personal communication, October 1974 - January 1975. Little Rock District Real Estate Division, Management and Disposal Branch, Little Rock, Arkansas.

ball Corps leases began in 1970. Original leases were granted by the respective counties; and the public use areas were outgranted to them for administration. The Corps assumed responsibility for management on 1 January 1970 and honored the unexpired term of the county leases

with capital investment of less than \$75,000) is computed on a fixed amount per year that reflects computed on a fixed minimum plus % of gross income; rent for minor leases (defined as a concession Rent for major leases (defined as a concession with capital investment of \$75,000 or more) is capital investment

dNot available.

swimming beach. Big Bay Park (31 acres) includes 25 picnic tables and 54 campsites. In addition to swimming facilities there are a public launching ramp, drinking water, and a comfort station. The USFS maintains other recreational facilities within its jurisdictional bounds in the vicinity of Table Rock Lake, but these are not within the analytical unit and generally not associated with the lake.

#### c. State

The Corps leases 506 acres to the Missouri Division of Parks and Recreation (MDPR) for a 25-year term with option to renew for 25 years to operate Table Rock State Park. The park is located to the north and south of the damsite. The lands to the north are used for maintenance and storage and for the resident engineer's temporary office complex through mutual agreement with the Corps until permanent facilities are completed in 1976 (1). The park proper is located to the south of the dam with an effective use acreage of 469 acres (3) (Table D.26.4).

There are 194 campsites at the state park, 40 of which have been added during the past year along with new restrooms. Twenty-one of the sites are serviced by electricity and sewage lines. Fees collected for use in 1973 by MDPR were \$4,250 (3).

In addition to a superintendent and an assistant who resides on location, there are three full-time maintenance personnel hired at the park. During the summer 11 additional employees are hired

aRRMS data indicate that there were 288 family campsites.

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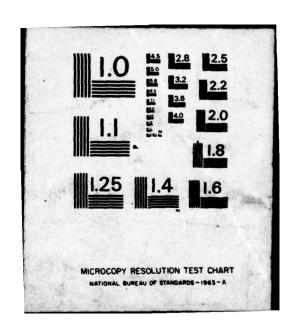


Table D.26.4. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Table Rock Dam and Reservoir. a

		Rer	Rental			Inves	Investment
Grantee	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	To 1974 (\$)	Planned (\$)
State of Missouri Dept. of Conservation	Lease	1962	52	•	51,300	120 L	N/A <sup>b</sup>
State of Missouri Dept. of Conservation	Lease	1957	25°	•		NA NA	N/A
State of Missouri Dept. of Natural Resources	Lease	1957	25°	•	506 <sup>d</sup>	N/A <sup>e</sup>	Park A
Totals	<b>.</b>			0	52,017		

ersonal communication, October 1974 - January 1975. Little Rock District, Real Estate Division, Management and Disposal Branch, Little Rock, Arkansas.

b Not available.

With option to renew for 25 years.

defective park acreage = 469 acres, the balance is being temporarily used by Corps resident engineers for administration purposes.

Personal communication, December 1974 - January 1975. Missouri Department of Natural Resources, Division of Parks and Recreation, Jefferson City, Missouri. Staff indicated that it would be very difficult to give an indication of investments to 1974 because of the diffuse nature of its capital improvement expenditure records.

with National Youth Corps funds and 4 are hired with MDPR funds. MDPR statistics indicate that there were 898,772 visitors in 1973 based on a count factor of 3.5 per vehicle.

Sewage is treated on the south side of the damsite via a twostage lagoon system that produces effluent at secondary treatment levels
which is owned and operated by MDPR. The Corps is building a new visitors
center next to the state park. This facility will be tied into this
sewage system through a working agreement with the MDPR. The treatment
system is presently being redesigned and brought up to tertiary stage
treatment standards. Solid wastes at the state park are removed by an
MDPR packer truck to a sanitary landfill which is operated by a private
contractor.

On summer holiday weekends and when weather is exceptionally good, all campsites are filled. MDPR maintains an overflow area which will allow for a maximum park capacity of 229 campers. As a result of the large number of privately owned campgrounds cropping up in the Table Rock Lake area, MDPR believes that it will be able to limit the number of camping units to the number of campsites beginning with the coming year (4).

MDPR leases the right to operate a private marina to a private operator. Here there are 55 slips which are rented on a seasonal basis. Boats are available for rent, and boating supplies, tackle, and bait are sold. The concessioner has been operating the facility at the state park for 12 years on a 5-year renewal contractual basis (4). A public boat launching area is located next to the concession.

There has been a policing problem at the state park. MDPR has asked the Corps for permission to close one of the two entrances to the park to control access to the park and to alleviate problems in fee collection. Currently, it is necessary for rangers to visit

aRRMS 1973 data indicate that there were 333,000 visitors.

each site every day to collect fees. Two of the reasons for the Corps not reacting positively to the request to close one of the access roads have been based on the pressures of the commercial establishments on MO 165 and the concessioner who operates the marina in the state park. (1).

Corps contractural stipulations, indicating that monies taken in above the cost of state park operation expenses must be returned to the Corps, have limited the ability of MDPR to make needed capital improvements at Table Rock State Park. The park is among the most heavily used recreation facilities in MO and since park facilities are inadequate to meet demands, MDPR wishes to see the Corps change its policy on fee collection so that capital improvement funding may be included as legitimate expenditures derived from use fee income.

The Arkansas Department of Parks and Tourism (ADPT) does not own or operate parks on the two arms of Table Rock Lake which extend into AR. ADPT has no plans at this time to construct facilities because the Corps is "...doing a good job in meeting lake-oriented recreational needs at Table Rock." Additionally, they feel that the northwest part of AR is already "over parked" (6).

#### d. Private

Silver Dollar City is located above the Table Rock Lake shore at Indian Ridge. This frontier theme facility is one of the prime commercial recreation attractions in the Ozarks. Associated with Silver Dollar City is Marvel Cave the country's third largest cavern. The complex is famous for its annual fall craft shows. The facility is jammed with visitors all summer long.

The Silver Dollar City complex covers an extensive part of Indian Point. The campground has 110 fully equipped sites offering electricity, water, sewerage, picnic tables, fireplaces, a general

store, playgrounds, laundry facilities, and evening family programs. Parking lots are situated in tiers on both sides of Indian Ridge. The complex is so expansive that trams are used to transport visitors from parking areas and campgrounds to the main attractions.

The 2-week fall craft festival attracts an estimated 125,000 visitors per year. Marvel Cave attracted 424,942 visitors in 1973. Total complex visitation counts for Silver Dollar City were reported as 1,061,063 in 1973.

Another of the top tourist attractions of the Ozarks is situated in the vicinity of Table Rock Lake. The Shepherd of the Hills Farm and Outdoor Theatre which depict Harold Bell Wrights's novel of the 1880's entitled "Shepherd of the Hills" is currently attracting an attendance of about 150,000 per year. Some of the other commercial recreation attractions in the area include mountain music theatres, restaurants serving special local foods, and gift and craft shops. One of the growing attractions is Mutton Hollow situated on MO 76 west of Cape Fair. Mutton Hollow is a restored town of the 1880's with numerous shops and native craftsmen who perform for the visitors and sell their wares. Rides through the Ozark Hills in rugged terrain, with breakfast and lunches being served along the trail at an old fashioned inn, are also offered at Mutton Hollow. The Passion Play depicting the life of Christ is located about 12 mi to the west of the lake. This outdoor drama is world famous and attracts a large number of people when in session.

There are 121 resorts located at Table Rock. These offer facilities ranging from motel-type accommodations to cabins with full house-keeping facilities. Swimming beaches, boats for hire, boat launching facilities (leased by the Corps) and other features such as swimming pools, miniature golf, and family centered programs are normally found at these resorts (Tables D.26.2 and D.26.5). Development

Table D.26.5. Outgrants for Easements and Resorts, Table Rock Dam and Reservoir.

		1		Ren	Rental			Inve	stment
Purpose	Grantee	Outgrants	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	To 1974 Planned (\$)	Planned (\$)
Rights-of-Way	Summary	264	Licenses	1	5-Perpetual	1,075	333.9	N/A <sup>b</sup>	N/A
Resorts	Summary	121	Leases	1	5-25	13,748	117.7	36,044	N/A
Totals		38				14,823	451.6	36,044+	

Real Estate Division, Little Rock District.

b/A means not available.

the shoreline where the Teases for small parcels of Corps land separating private land upon which major recreation facilities are located operator constructs a boating facility to complement his operation. CLeases for

on private lands contiguous to the reservoir is summarized in Table D.26.6.

## 2. Lake Resources

During the spring floods of 1973 the lake rose almost 30 feet after a 2-year low. The lake reached its capacity just as rains subsided in early May 1973. Serious flooding problems downstream were averted by the control of the discharge entering the Lake Taneycomo section of the White River. During the several months which were required to release the floodwaters, large losses of timber and substantial bank erosion caused by high waters were recorded. The public campgrounds maintained by the Corps, USFS, and MDPR were in large part under water until late summer 1973 (7).

There was a marked decrease in camping visitation at Table Rock in 1973 because of the high waters. Apparently the impending fuel crisis was not a significant factor because gasoline shortages were not yet severly pronounced near the end of the recreation season.

State and federal fishery officials realized that cold water releases through Table Rock dam would convert the character of habitat in Lake Taneycomo, a narrow hydroelectric impoundment, built in 1913 that heads at the Table Rock tailrace, into an environment that would support trout. Therefore a hatchery was constructed by the MDC on Corps lands.

MDC operates a continuous stocking program for trout at Table Rock Lake and Lake Taneycomo. At the Shepherd of the Hills Hatchery on the White River just below the damsite, approximately 22,000 steelhead and 237,000 rainbow trout were released into Lake Taneycomo in 1973. The hatchery is a tourist attraction. Last year 301,061 people visited the facility (8).

It was not until 1970 that the cause of periodic kills of trout in Lake Taneycomo were traced to the very low dissolved oxygen content

Table D.26.6. Summary of Development on Private Lands Contiguous to Table Rock Dam and Reservoir.

Number of vacation resorts, cottages, camps, lodges, motels and similar accommodations located on private property adjoining Government ownership providing overnight	esa tiba este Abadematicac
accommodations.	293
Number of accommodations available in above establishments	10,391
Number of restaurants, cafes, etc., on property adjoining Government ownership.	112
Number of subdivisions adjoining Government ownership:	284
a. Total number of lots in subdivisions.	18,543
b. Number of lots developed.	6,721
Number of real estate transfers in counties in which lake is located.	\$ 9,571
Assessed valuation of all taxable property in counties in which lake is located. (List by county)	\$127,033,341

aLittle Rock District. 1973. Summary of statistical data, Table Rock Lake. Table Rock Dam and Reservoir, Branson, Missouri.

of the water released from Table Rock. Lake water stratifies during the summer and the hypolimnion becomes essentially anaerobic.

The MDC lists discharges from the City of Springfield and Neosho as particularly serious problems causing "...increased algal growths and deteriorating water conditions throughout the lower portion of the basin" (9). The James River arm is the focus for intensive subdivision and commercial recreation development. Also, the Missouri Clean Water Commission lists the status of abatement for six of nine industrial plans discharging effluents into the James River System as unsatisfactory (10).

In addition, six major sewage treatment plants discharge effluent into stream courses within the analytical unit. All subject wastes to some form of secondary treatment and they currently meet AR and MO mutual agreement standards for secondary treatment plants (1, 11). State officials agree that pollution problems will have to be faced in the near future. This judgement is confirmed by increasing populations of "plankton-type algae" (12) in the James River Arm of Table Rock Lake.

The dam does not have a multi-strata release system so non-surface waters can only be released from the 140 ft level. The first approach taken to increase oxygen supply was to allow for surface discharge from Table Rock Lake, but this was only a temporary measure because varying lake surface levels could not be depended upon. By 1971 an oxygen injection system was developed. This air compressor operation proved to be a high maintenance and management problem to the Corps. By the time low oxygen readings again became critical in the fall of 1973, a liquid oxygen system was in operation. Through the use of this system oxygen is injected into the water until December when normal lake turnover again began to meet downstream needs. The liquid oxygen

injection system consists of an 11,000 gallon holding tank and vaporizer for converting the oxygen from a liquid to a gaseous state before releases into the water. At the height of critical oxygen deficiency, liquid oxygen tank trucks arrive at the site at 4-hour intervals to keep the system in operation (7).

The water in Table Rock Lake is relatively clean and usually very clear. Major inflow from the White River is released through the Beaver Project in Arkansas and is of high quality and partially accounts for clear water conditions in the headwaters of the lake.

The James River arm, however, is a source of concern. The MDC reports that: "The principal tributaries of the James River that had serious pollution problems were Wilson Creek, South Creek, and Finley Creek...(and) without better sewage treatment or abatement of discharges we may expect continuing deterioration of water quality in the James River" (9).

Fishing at the lake normally is very popular. During warm weather months anglers can always be seen on the lake during the daylight hours. There are also a number of bass clubs headquartered at Table Rock Lake which hold contests almost weekly throughout the spring, summer, and fall (8).

Good fishing usually tapers off when there are high water conditions at the lake. During 1973, for instance, when Table Rock Lake was filled to its capacity, fishing was very poor until waters began to recede in May. There is an abundance of large-mouth bass, spotted bass, walleye catfish, and sunfish. White bass and crappie are also important species (8, 13).

#### 3. Wildlife

Waterfowl apparently are on the increase at Table Rock Lake. The

population potential of the lake is hampered drastically, however, by the lack of crops for food in the vicinity of the lake. The small amount of feed is due to the small amount of land which exists between the water line and the Corps property line where private residential and commercial resort development has dominated the scene. This situation has hindered MDC's wildlife management program at the lake (8).

The Corps licenses approximately 51,300 acres of land and water above the damsite to MDC for conservation and enhancement of fish and wildlife. The responsibilities under this license consist of providing food plots for wildlife and patrolling the area. Land which is available and suitable for growing crops is limited. During high water periods land areas are cut drastically and planting of crops is severely limited. For instance, MDC reported that it was only able to develop 12 food plots of about 1 acre each during the high water conditions in 1973 (8). MDC also has 211 acres of Corps licensed land and water immediately downstream from the damsite. The purpose of this area is to develop and manage hatchery and public access areas (14).

In recent years hunters have reported that they have seen more deer than ever before in the vicinity of the project. Deer can be seen grazing around the project office at the damsite during the middle of the day. Populations of squirrels, rabbits, and Turkeys appear to be stable (8). Hunting accounted for 76,822 activity days in 1973 (Table D.26.2).

#### 4. Other Land Use

Land use next to Corps property primarily consists of single-family second and retirement home development. There are some 278 subdivisions lying contiguous to Corps lands (1). The largest subdivision in development stage is on Holiday Island in the White River Arm of AR where there are 5,000 lots subdivided on a 6,000 acre tract (11). Homes

at Table Rock are generally very well kept ranging from medium to large in size and from average (\$30,000) to high (\$100,000) in cost. Other subdivisions range from fully developed to totally undeveloped while quality of plat design ranges from poor to good. Many subdivisions are laid out on a grid pattern totally disregarding the topographical features in the area. A few have been very carefully designed using the highest standards for residential subdivisions (1).

The Corps has outgranted 52,537 acres of 57,745 acres of land held in fee simple title (91%) to other entities. The largest acreage has been outgranted to agencies of the State of Missouri for fish and wildlife and public recreation purposes (52,017 acres or 99% of all outgranted lands). Of this amount, however, 43,100 acres are under water at the conservation pool elevation (Table D.26.7). Some more or less regularly inundated lands do have fish and wildlife values. The level plots can be planted while exposed thereby enhancing the shallow water fish habitat formed when the water rises again (15). Outgranting permanently inundated land to a state agency seemed peculiar but was not questioned.

#### 5. Resource Use Controls

As of 1973 the Corps had active permits outstanding for 496 individual private floating docks and 440 commercial docks; outgrants for 132 docks had also been let to resort owners and commercial concessioners (Table D.26.8). The number of boats served by these docks, stationed more or less permanently at the lake, was estimated to be 5,043.

In some coves the boat docks have been spaced at less than 40 ft intervals along the entire shoreline. Such concentrations of docks make it nearly impossible for fishermen to cast into the shallow areas near the shore (15).

Table D.26.7. Summary of Outgrants, Table Rock Lake.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
ish and Wildlife and Recreation	- uo			
Public Parks	3	•	. 52,017	N/A
Recreation Commercial	13	16,172	9.89	1,818,245
Easements and Resorts	385	14,823	451.6	36,044
Totals	401	30,995	52,537.2	1,854,289

a Not available.

bris figure varies drastically from the Manageable Resource Lands figure in Table D.26.1 because Fish and Wildlife Management licenses to the State of Missouri include areas inundated by the normal pool.

Table D.26.8. Boat Dock and Access Facilities at Table Rock Dam and Reservoir in 1973.

Facility is well a reserved to be not the company	Number	Capacity (No. of Boats)
FLOATING		
Private Docks (individual owners)	496	980
Community Docks (2 or more owners)	440	1,989
Boat w/cabin docks (limited resort lease included)	120	536
Commercial Boat Docks:		We will be a first
Rental boats	817 (O <u>C</u> 08)	458
Dry storage	dagay n <u>a</u> n sa	0
Stored boats	_11048	905
Mooring buoys or bank tie-up	63 ni 12 gain	175
TOTAL	1,056	5,043
ACCESS		ko ankaz sibil - Ale - de je de Logazioni spanisti i independe
Launching Lanes in Parks	84	
Severed Roads Used for Launching (Lanes)	65	
Rights-of-Way for Launching Complexes	75	
Tramways and the same transfer of the same transfer	22	

<sup>&</sup>lt;sup>a</sup>Little Rock District. 1973. Summary of statistical data, Table Rock Lake. Table Rock Dam and Reservoir, Branson, Missouri.

The Corps has drafted a lakeshore management plan for the lake. In accord with the instructions contained in ER 1130-2-406, the shore-lands have been classified according to their natural and scenic quality, their physical limitations (such as exposure to strong prevailing winds), and existing uses. Thirteen percent of the shoreline was proposed for boat docks. One of the goals of the plan by 1980 is to have all private boats moored in approved public areas. The reason for the goal is clear: break the pattern of continuous docks serving only one household so that the general public can enjoy the publicly owned shoreland. This provision of the lakeshore management plan has been explicitly addressed by the District Engineer:

Docks may remain in their present location for the lifetime of the owner if they are properly maintained. If the dock is sold, it would have to be moved to an approved location or removed from the lake. Permits which are not in effect on existing docks that are located in areas which will be prohibited in the future will not be transferred to new owners according to the lakeshore management regulation which has been published in the Federal Register on May 30, 1974. (11).

Among recommendations made by project personnel over the signature of the Resident Engineer was a proposal that major subdivisions provide boat storage on private land with only launching facilities, including landing docks, to serve the owners of the boats stored/built on public land.

Project personnel distributed a dock zoning questionnaire to 258 visitors selected at random from lists of persons submitting written suggestions in the past. On the basis of 128 returns, 59% owned boats, but only 3% owned a boat dock; 44% thought boat dock permits should be perpetual; 58% felt present docks did not appreciably despoil the

beauty of the lake and shoreline; and 12% suggested zoning for docks (16).

The MDC has strongly supported the provisions of the lakeshore management plan and field officers point to long-term problems they feel have been caused by excessive numbers of docks at Lake Taneycomo and Lake-of-the-Ozarks (15).

Hearings have been held on the proposed lakeshore management plan. The proposals to phase out individual docks in highly developed areas were sharply attacked. The docks are thought of as property rights to be bought and sold as part of property adjoining federal land. It was estimated by a person active in the real estate business that the existence of a landscaping outgrant and a floating dock permit added \$4,000 to the worth of lots fronting on Corps property (17). Further, property owners contended that they have paid the value when purchasing developed lots from others and any doubt about transfer of the dock to a new owner as part of the real estate would be viewed as a cash loss.

The management plan proposals were currently under review by the district staff and field personnel were fearful the proposals would be weakened (1).

The Missouri Boating Commission (MBC) is responsible for policing and patrolling the lake. This responsibility pertains to buoy location, maintaining wake and no wake areas, and general policing of traffic. The MBC has five men and a captain with six patrol boats stationed at Table Rock. In addition, two recovery and rescue boats have been assigned and stationed permanently at the lake. As of September 1974, the MBC recorded 5 drownings, 5 boating collisions with damages ranging from \$50 to \$3,000 to both docks and boats, 4 sinkings, and 1 fatility caused by lightening (18).

There are several diving schools at Table Rock Lake due to the depth and clearness of the water. Some of the schools teach novices in swimming pools onshore before they are allowed to enter the lake, while others hold initial classes in the lake itself. Most fatalities at Table Rock Lake are attributed to the drowning of scuba divers. Many bodies have never been recovered because of the depth of the lake. Depths at the damsite reach 252 ft and there are many snags and other obstructive hazards underwater that tend to ensnarl divers. Periodically bodies of divers who have drowned from 30 days to 3-years ago break loose, float to the top, and are recovered (18).

Boat operators on Table Rock Lake are required to keep their boats out of buoyed swimming areas. According to MBC patrolmen, the major problem is keeping swimmers out of boating areas. Some accidents have occurred at boat launching sites where children have been injured or drowned as a result of being hit by boats in heavy traffic conditions. The MBC estimates that there are over 5,000 active boats on the lake on holiday weekends (18).

The MBC has suggested that bridges crossing Table Rock Lake be equipped with navigation lights and that these lights should be placed on the bridge piers to avoid collisions at night. The MBC also recommends that all power lines entering the lake should be marked and that all other man-made obstructions where navigation is heavy should be lighted. The MBC has approached the Corps and the Missouri State Highway Commission on this matter, but neither has responded. There are lights on the bridges at the Lake-of-the-Ozarks and there are plans to place lights on bridges which are now under construction at the Pomme de Terre Lake. Table Rock Lake has a number of bass clubs which hold night fishing tournaments during the spring, summer, and fall months. The MBC is concerned about heavy traffic and the safety of boaters who participate in these night events (18).

The U. S. Coast Guard provides a negligible policing service at Table Rock Lake. Periodically, boarding teams from the Second Coast Guard District fly into the lake area to make spot checks on boaters and to inspect their equipment. The U. S. Navy has also participated in deep water body recovery and dam maintenance operations at Table Rock Lake. The Navy is called in because it has sophisticated television equipment to search for bodies and sunken vessels in very deep water and to find leaks in the dam (1, 18).

Probably the largest threat to the lake resource is the Holiday Island subdivision in Carroll County, AR near the community of Beaver where a developer has subdivided a 6,000 acre tract into 5,000 lots. The development is surrounded totally by Corps property. This very large development lacks plans for public water or sewer systems. Each lot will have its own septic tank and well. Arkansas Department of Pollution Control and Ecology (APCE) has taken a strong interest in this new subdivision and is now requiring the developers to design public water and sewer systems to be submitted to the APCE for approval. Approximately 500 lots have been sold to date and about 100 have been developed (11).

Holiday Island is in a relatively early stage of development and can be modified to ensure that pollution problems will not develop.

Nearly all subdivisions at Table Rock Lake are served by individual wells and septic tanks. There are only six public sewage treatment systems in operation at the lake, and these serve only a minor fraction of the commercial establishments and dwellings. Because of the relative unsophistication of the local units of government in the vicinity of the project, the prospects of developing water and sanitary systems to serve compact development are not good. The largest sewage treatment plant is located at Kimberling City on the northshore at MO 13. The only system

which presents potential problems for Table Rock Lake is at Silver Dollar City. The Corps project staff estimates that serious effluent problems will develop at this popular attraction during the ensuing summer as visitation increases (1).

Although there are no land-use controls exercised in Taney County; the recreation-oriented commercial development that has taken place across MO 165 from the state park is not substantial. Presently there are two motels, three restaurants, two general stores, and two private campgrounds in the vicinity.

None of the three counties in MO or two counties in AR exercise landuse controls which would affect private development in the vicinity of Table Rock Lake; the aesthetic and natural beauty of the lake is degraded and placed in jeopardy by homes and the large number of boat docks along the shore where land is steepest the natural features of the lake are encroached upon most severely. The Lakes Country Regional Planning Commission (LCRPC) in Republic, MO has assisted the Taney County Planning and Zoning Commission to prepare an ordinance titled Zoning Order and Subdivision Regulation. This work was completed on 15 January 1974, with financial aid from the U. S. Department of Housing and Urban Development through its 701 community planning assistance program. There has been a substantial amount of local opposition to the adoption of the land-use controls ordinance, and the regulations have not been passed by the Taney County Judges. The LCRPC has had a difficult time in working with its respective 10 counties in southwestern MO. Opposition has been so great that a number of counties have given up their membership and have withdrawn their support from the LCRPC. In light of this experience, it is predicted that none of the five counties in both MO and AR or any of the municipalities in the vicinity of Table Rock will be applying substantial land-use controls in areas contiguous to the project in the near future.

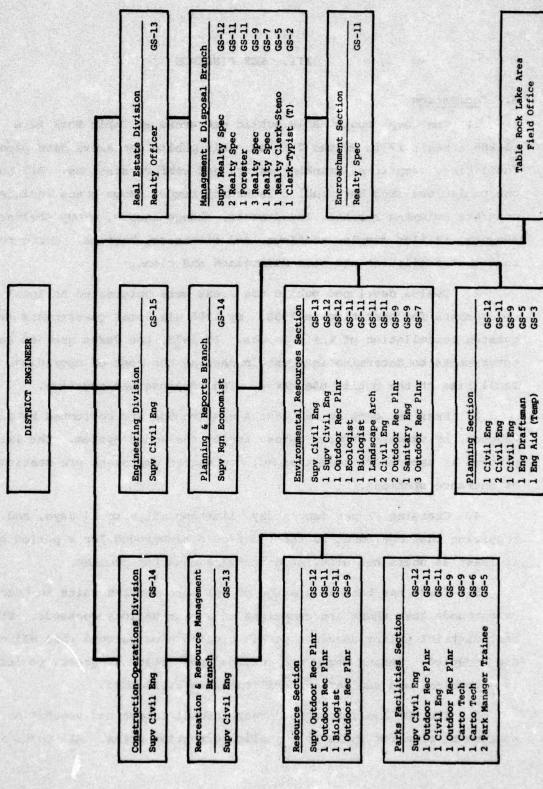
Encroachment on Corps property has been a problem since 1960. Monumentation is only 20% complete. Priority is given to those areas where encroachment is most severe (14). The Corps holds a deed of record for the lands it owns. Local surveyers, however, have a difficult time determining which is Corps land and which is privately held land, but they do provide warranty deeds based on their work. Upon this warranty, title insurance is issued to prospective property owners. Conflicts often arise after sales transactions are completed when the Corps comes to the realization that property has been sold in conflict with its recorded deed descriptions. In some localities along the lakeshore, the Corps has had to resort to painting trees to indicate where it believes Corps property begins. Corners of buildings and supporting poles of storage sheds have been painted where encroachment has taken place. The monumentation process has been very slow over the years. Expectations for completion of the work are uncertain because of the undependable annual funding (1, 14).

The most significant encroachment problem has to do with the placement of mobile homes on Corps property. The owners of these residences are able to move their mobile homes onto Corps land and remain there undetected for long periods of time. It is very difficult to prove whether encroachment is done on purpose or by accident. The advantage to mobile home owners is that the structures can be moved onto and off Corps property inexpensively. If violations are eventually detected by the Corps, the residences can be moved with little trouble and the low value investments and improvements on the property can be left without substantial loss (1, 14). A 1971 report by the Little Rock District indicated that four encroachment violations involving unauthorized buildings were to be resolved by disposing affected project lands to building owners (19). Additionally, three other unauthorized building encroachments were to be resolved by issuing easements or permits (19).

Another problem presented by lack of monumentation is tree cutting for providing vistas of the lake. Until two years ago the Corps policy at Table Rock was to allow for clear cutting from residences to the lake and to plant grass and shrubbery in place of the trees. At that time, however, the policy was changed, and clearing permits were limited to allowing for meandering paths only. The stipulation was that paths would be allowed, but only if they meandered to the point where a clear view of private property could not be had along the path from the lake. Because of this policy change there is confusion on the part of private landholders. Clear cutting still continues since only some individuals are adhering to the new policy (1, 14).

There are 56 Corps employees in the Table Rock Resident Office at Branson. Eight personnel (16 temporary) are located in the Ranger and Surveillance Section, 19 (4 temporary) serve in the Preventive Maintenance Section, 2 are situated in Engineering and Contract Support Branch, 20 are assigned to the Hydro-Power Branch, and 5 (1 temporary) serve in the Administrative Branch. All personnel are responsible to the resident engineer. The Ranger and Surveillance Section is short on manpower. Several additional rangers are needed on a permanent basis to patrol Corps public use areas during the winter months and to monitor development along the lake shore. In 1973, the staff began patrolling the shoreline on a regular 3-month basis with the aid of a helicopter to check docks and encroachments. More people are needed, however, to adequately patrol the 745-mi shoreline and 900+ mi of Corps property line. Figure D.26.2 shows the recreation resource management interrelationships at the Little Rock District.

Recreation-Resource Management Interrelationships - Little Rock Engineer District. Figure D. 26.2.



#### III. KEY FINDINGS

# A. Recreation

- 1. The Corps operates 19 public use areas at Table Rock Lake (1,286 acres); 17 in MO and 2 in AR. All public use areas have picnic facilities, campsites, drinking water, and comfort stations. All but one public use area have public launching ramps. Some areas include concrete swimming beaches, laundromats, change houses, group shelters, showers, trailer dumping stations, and electrical hookups. Corps recreational facilities are well maintained and clean.
- 2. Twelve developed public use areas were outgranted to local governments for operation in 1958. By 1968 all local governments requested cancellation of their leases. In 1973, the Corps queried local governments to determine interest in sharing the cost of upgrading facilities at the public use areas. The response was negative.
- 3. Fees for camping in Class A campgrounds are collected by roving rangers, by rangers at main gates, and by the honor system. The latter process is used where nonuniformed, contracted employees are stationed at entrance stations.
- 4. Charging \$2 per camper day, limiting stays to 14 days, and requiring that equipment be removed from a campground for a period of at least 24 hours has alleviated a severe squatter problem.
- 5. There has been an average of 50% more camping units in Corps campgrounds than there are campsites on summer holiday weekends. Present district policy does not permit closing a campground when all sites are occupied. During heavy use periods, congestion is great, policing is a problem, and sanitation facilities are overloaded.
- 6. The MDC has initiated a recreational forest and vegetation management plan for Table Rock public recreation areas. All costs are

fully reimbursed by the Corps. Table Rock State Park is operated by MDPR on 506 acres outgranted by the Corps. The park is one of the heaviest used in the state; 898,711 visitors were recorded in 1973. There are 194 campsites - 21 are serviced by electricity and sewage. Beginning with the 1975 season, MDPR will refuse entry when all sites are filled. Campers will be referred to Corps and commercial campgrounds. A marina where 55 rental boat slips, boat rentals and motor service, groceries, and fishing supplies are offered is operated by a concessioner operating under a third-party lease contract.

- 7. The MDPR has requested permission to permanently close one of two park entrances to effect complete control of access. The Corps has not concurred.
- 8. There is an independent and franchised campground boom at Table Rock Lake. At least 30 commercial campgrounds are now in operation in the area and 10 are in stages of development. The increased supply of campsites may ease pressure at Corps and state campgrounds.
- 9. There are 121 resorts located at Table Rock Lake. These offer facilities ranging from motel-type accommodations to cabins with full housekeeping facilities. All depend upon permits granting access to the lake across Corps land.
- 10. Silver Dollar City, the Passion Play, Mutton Hollow, and the Shepherd of the Hills drama are large commercial recreation attractions. Silver Dollar City is a multi-million dollar plant, associated with Marvel Cave, contiguous to Corps property. All have had a high degree of influence on the project particularly in visitation rates at public use areas.

## B. Fish and Wildlife

1. The MDC manages 51,300 acres under license from the Corps. At normal pool elevation (915 ft msl) 43,100 acres of the licensed land is under water.

- 2. The MDC operates Shepherd of the Hills Hatchery and a public access area on the White River just below the dam on 211 acres of land and water outgranted by the Corps. A continuous trout stocking program is carried on below the dam on the White River.
- 3. Trout fish kills attributed to low oxygen levels in Lake Taneycomo were first noticed in 1970. The Corps now operates a system of
  oxygen injection to insure that water released from the dam contains
  sufficient dissolved oxygen to support fish life in Lake Tareycomo.
- 4. Bass Clubs are popular on the lake and tournaments are held almost weekly in season.
- Waterfowl populations are apparently increasing despite the dearth of land available for wildlife crop cultivation.
- 6. The white-tailed deer population is increasing on the project area. Upland game populations of squirrels, rabbits, and turkeys appear to be static. Conservation officers report that coyotes, bobcats, and other predators are common in the lake basin.

## C. Corps and Contiguous Land Use

- 1. Corps project operation lands occupied 340 acres at the damsite and 946 acres developed as public use areas. The Corps plans to construct a multi-purpose building to house project operations and a visitor center next to Table Rock Lake State Park.
- 2. Intensive residential and report land use can be seen in nearly all sections of the lake where there is road access to the vicinity of the shoreline. Concentrations of floating docks permitted by the Corps are serious threats to the scenic beauty of the lake. The goal of the Corps' proposed shoreline management plan is to shift all boats now moored at individual docks to community docks located at strategic intervals along the shore by 1980.

- 3. Private housing development clustered around public use areas makes control of access very difficult. In some areas, internal circulation roads have been constructed adjacent to commercial and residential development.
- 4. No local government has adopted zoning, building codes, or subdivision regulation ordinances to guide new growth and to protect property investments and lake resources.
- 5. The Corps has identified 278 subdivisions platted on land adjacent to federal property. Approximately 2,000 lots have been developed. The largest subdivision (5,000 lots) is Holiday Island located on the White River Arm in AR. This 6,000 acre development is fringed by Corps property. AR is requiring the developer to install a sewage collection system and treatment plant before further development occurs. About 500 lots have been sold to date and 100 have been developed.
- 6. Most residences reflect substantial investments. They have been built for retirement or second homes although some recent construction, particularly near Branson, MO is for permanent, working-aged families. Quality of subdivision design ranges from poor to good. Many are laid out in grid patterns with little or no regard for the typically steep topography of the lake area. A few plats have been very carefully designed using high planning and engineering standards.

### D. Real Estate Programs and Practices

1. Encroachment has been severe, particularly with mobile homes. Insufficient enforcement staff prevents continuing inspection, and encroachments may remain undetected for long periods. The economic consequences to the owner are low and the Corps is unable to extract civil or criminal penalties because boundary monumentation is often lacking.

- Less than 20% of Corps property has been monumented. When present work is completed, 53.2% of the exterior Corps property line will have been surveyed.
- 3. Local surveyors have provided warrenty deeds upon which title insurance is issued. The surveys often conflict with Corps deed descriptions.
- 4. The Corps issues leases to 121 resorts to permit construction of docks and related facilities provided that the docks be used only by the resort owners and their guests.

# E. Corps Organization

- 1. The Table Rock Resident Engineer Office has a staff of 56 personnel but more are needed. The area which appears to need more manpower to accomplish its assigned tasks is the Ranger and Surveillance Section. Because of the personnel shortage, reconnaissance of the lake must be limited to a 2 to 3 month cycle. A helicopter has been employed during the past year to facilitate inspections.
- 2. The resident engineer organization further decentralizes administration of project resources. The resident engineer has responsibility for Corps project management and resource supervision within a watershed unit. The unit managed from Table Rock Lake includes Lake Taneycomo. In addition to patrol and facility inspection on Table Rock Lake, Ranger and Surveillance and Preventive Maintenance Section personnel also conduct similar work on Lake Taneycomo under authority of Section 10 of the River and Harbor Act of 1899.
- 4. The proposed shoreline management plans for Table Rock and Taneycomo were drafted by the resident engineer staff with guidance from the district. This process indicates a high degree of autonomy for the resident engineers.

# F. Environmental Problems

1. There are six sewage treatment plants which inject effluent into the lake. There have been no serious problems to date. The largest plant is at the Silver Dollar City complex. The resident Corps staff believes that serious problems may develop in the next year or two because of the increasing visitation to the attraction.

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27. EUFAULA LAKE
Southwest Division
Tulsa District
Oklahoma

## I. SETTING

## A. Location

Eufaula Lake and Dam are located in east central Oklahoma on the Canadian River about 27 miles (mi) west of the confluence of the Arkansas and Canadian Rivers. The arms of the lake expand generally to the west 35 mi from the dam; however, other branches extend northwest up the North Canadian and Deep Fork Canadian Rivers, west up the Canadian River, and southwest up Gaines Creek. The maximum width of each arm is about 3 mi making an irregular lake area of 102,500 acres (1) at the normal pool elevation of 585 ft mean sea level (msl) (2). The lake has a shoreline of 600 mi that lies principally in McIntosh and Haskell Counties and involves minor portions of Latimer, Muskogee, Okmulgee, and Pittsburg Counties.

Access to the lake is good from three U. S. highways, two limited access highways, and three state highways that surround and transect the lake. Interstate 40 is the main east-west artery through the state connecting Oklahoma City, 97 mi west of the lake, and Fort Smith, Arkansas, 77 mi east of the lake. The "Indian Nation Turnpike" and U. S. 75 combine along the western region of the lake connecting Tulsa (58 mi north), Okmulgee (12 mi northwest), and Henryetta (9 mi northwest) to the lake. Along the southern region of the lake, U. S. 270 passes east-west through McAlester and Haileyville-Hartshorne, 6 and 5 mi south of the lake respectively. Combining along the eastern region of the lake,

OK 2 and 71 connect many smaller towns and communities to the lake. Serving as the major routes to recreation access points around the lake, U. S. 69 traverses from northeast to southwest and OK 9 traverses from east to west through the project. These routes cross the arms of the lake in six locations and cross each other in the city of Eufaula. Three airstrips exist within the project boundary at Arrowhead and Fountainhead State Parks and one just west of Highway 9 Landing, a public use area (Figure D.27.1).

# B. Authorization and Purposes

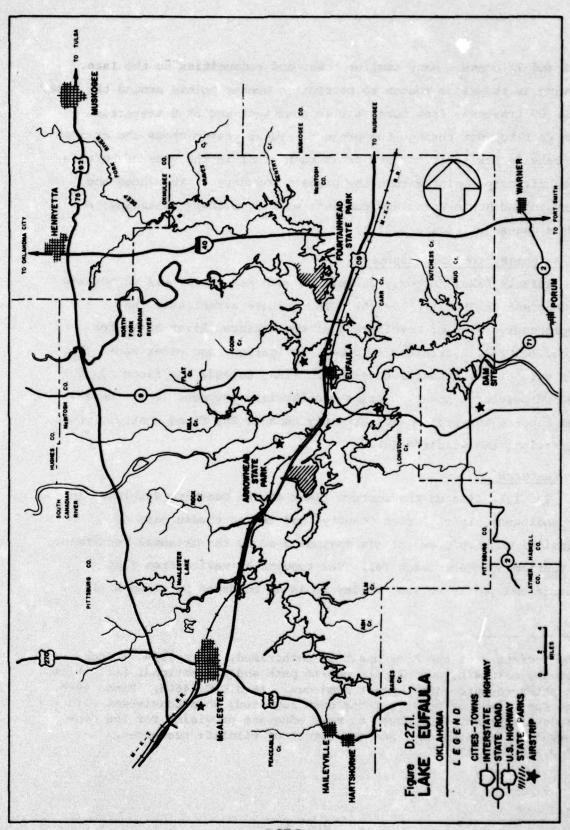
Eufaula Lake, formerly Eufaula Dam and Reservoir, was authorized by Congress in 1946 (PL 79-525). The statute established the Comprehensive Plan of Development of the Arkansas River Basin for "flood control, hydroelectric power, navigation, and other uses" (1). As a unit of the Arkansas River Basin Plan, Eufaula has flood control and hydroelectric power as primary authorized purposes (2). The 1973 RRMS reports the project is currently managed for flood control, power, recreation, and wildlife (3).

#### C. Features

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The lake lies on the western flank of the Ouachita Highlands in the southwest tip of "Green Country" and the northwest part of "Kiamichi Country", two of six regions used by the Oklahoma Department of Tourism and Recreation (4). The topography varies from flat prairie and gently rolling valley to lands bordered by steep hilly

The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).



D.27.3.

terrain. Oak-hickory forests with occasional prairie areas are characteristic of the southern and northeastern region around the lake. Included in the oak-hickory forest are: blackjack oak, post oak, red oak, black oak, chinquapin oak, black hickory, and winged elm, with a ground cover of sassafras, bluestem, cedar, huckleberry, hazelnut, and bloodroot. Tall-grass prairie, consisting of sage, prairie beardgrass, Indian grass, and switchgrass, is found on the west central and northwestern region around the lake (1).

The geological resources of the lake region include: limestones, marls, sandstones, shale, and some granite (2). Large rock outcroppings of unusual formations occur on the high plateaus and hills surrounding the lake, and sandy soils, characteristic of severe bank sloughing, surround the lake shoreline (2).

Eufaula Dam controls the runoff from the Canadian River Basin (47,522 square mi) where relatively heavy winter snowfall in the western portion of the basin, and local high intensity summer thunderstorms in the central and eastern portions of the basin, are conducive to severe flooding (2). The average annual snowfall is 6.3 inches. The average annual rainfall is 37.4 inches, 63.5% occurring during April through September. These conditions have established an average yearly runoff, for the period January 1923 to December 1972, of 2,772.9 acre-ft (2). The project has a storage capacity of 3,848,000 acre-ft of which 1,470,000 acre-ft is flood control storage with the remainder allocated for power, water supply, and accumulated sediment storage (5).

The project consists of an earth-fill embankment, combined spillway and outlet works, and power house with three 35,000 kilowatt generators (2). Flood storage and programmed release of water result in varying pool levels throughout the year. By releasing a constant

volume, downstream flooding is reduced and year-round navigation is possible. The powerhouse is a peaking plant which produces power when demands are high. The generated power is marketed by the Southwestern Power Administration (2). Refer to Table D.27.1 for further project features.

Table D.27.1. Resource Statistics, Eufaula Lake.

Date of Authorization	1946 <sup>a</sup>
Rights in Land Acquired Between	1957 - 1963 <sup>b</sup>
Date of Impoundment	February, 1964 <sup>C</sup>
Date of Full Operation	September, 1964 <sup>C</sup>
Lake Size When Water Level is at:	
Maximum Pool Elevation (597 ft msl)	143,000 acres <sup>d</sup>
Normal Power Pool Elevation (585 ft msl)	102,500 acres <sup>d</sup>
Normal Minimum Pool Elevation	N/A <sup>e</sup>
Minimum Design Elevation (565 ft msl)	48,000 acresf
Water Fluctuation - Summer Recreation Season	10 feet <sup>a</sup>
Shoreline at Normal Pool	600 miles <sup>C</sup>
Held in Fee Simple by Corps	600 miles <sup>C</sup>
Land Area Managed by Corps	THE PERSON OF TH
Total Land in Project	183,859 acres <sup>d</sup>
Fee Title in U. S. 153,967 acres	
Easements 29,892 acres d	
Project Operations Lands	150 acres <sup>d</sup>
Manageable Resource Lands	51,317 acres <sup>9</sup>

Tulsa District. 1974. Draft plan of the updated master plan Eufaula Lake, Oklahoma. Tulsa, Oklahoma.

Personal communication, 23 October 1974. Tulsa District, Real Estate Division, Acquisition Branch, Tulsa, Oklahoma.

<sup>&</sup>lt;sup>C</sup>RRMS. 1973.

d Tulsa District. 1973. Appendix A, project resource management plan to design memorandum no. 12B, master plan for Eufaula Lake. Tulsa, Oklahoma.

e<sub>Not available.</sub>

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Grotal Project Land minus (Land Flooded at Normal Power Pool + Project
Operation Land + Flowage Easements).

# II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

## A. Analytical Unit

A 10 mi zone around the lake includes all the major highway arteries that lead to the lake and delineates that portion of the surrounding counties most directly influenced by the lake. Major portions of McIntosh and Pittsburg Counties and lesser portions of Haskell, Latimer, Muckogee, and Okmulgee Counties are directly influenced by the lake and directly affect the lake itself (Figure D.27.1).

The total population of McIntosh, Pittsburg, Haskell, and Okmulgee Counties in 1970 was 94,929, showing only a 2.3% increase over the 1960 population. McIntosh and Pittsburg Counties are expected to increase in population only 1.4% from 1970 to 1985; the population of Haskell and Okmulgee Counties is expected to decrease 2.8% from 1970 to 1985. Therefore the above counties are expected to remain relatively stable in population, with those counties most closely associated with the lake slightly increasing in population and those counties less influenced by the lake decreasing slightly in population (2).

Agriculture and livestock production are the predominant types of employment in the counties surrounding the lake; there is no employment in industrial sectors. The 1970 per capita income for those counties surrounding the lake is relatively low compared to the state average. Per capita income for McIntosh County was \$1,506 and for Pittsburg \$3,432 (Pittsburg County includes McAlester, the largest urban center within the 10 mi zone around the lake, with a population of 18,802 in 1970). Per capita incomes for the other counties were: Haskell \$1,363, Latimer \$1,815, Muskogee \$2,958, and Okmulgee \$2,507 (2).

The closest standard metropolitan statistical areas to the lake are Tulsa and Oklahoma City. Tulsa, with a population of 475,264 in 1970, has a 6.2% increase in population from 1960 to 1970 and is expected to increase 22.4% from 1970 to 1985. The population of Oklahoma City, 641,801 in 1970, has increased 9.1% from 1960 to 1970 and is expected to increase 28.1% from 1970 to 1985 (2).

An estimated 90% of the visitors to the Eufaula Lake project are from the counties in and around the project, the remainder come primarily from Oklahoma City 97 mi west of the lake. With the exception of Thunderbird Lake (BuRec) just outside Oklahoma City, Lake Eufaula provides the closest major recreation area for Oklahoma City residents. Because several similar recreation lakes and/or reservoirs are closer to Tulsa (58 mi north of the lake) and Muskogee (31 mi northeast of the lake), these residents do not make extensive use of Eufaula Lake (2).

## B. Ownership

## 1. Corps

The project consists of 153,967 acres acquired in fee, of which 51,467 acres are above the normal power pool elevation, and 29,893 acres of flowage easement (Table D.27.1). The fee take-line was at elevation 597 ft.msl, which is 2 ft above normal power pool and the 5-year flood frequency elevation (1). Flowage easements were acquired to the 600 ft msl or 50-year flood frequency elevation, whichever was highest (1). The fee lands cost on the average \$100 per acre and the flowage easements cost on the average \$72 per acre (based on acreages acquired through June 1974) (6).

### 2. State Government and Private

The Oklahoma Lake Redevelopment Authority (OLRA) owns 548 acres at Fountainhead State Park and 257 acres at Arrowhead State Park (7).

This land was acquired for construction of lodges and cabins within the land leased from the Corps for development of the state parks (7).

The region around Eufaula Lake is privately owned and predominantly rural although the land contiguous the project boundary has 136 subdivisions platted (8).

# C. Resource Management

#### 1. Recreation

At Eufaula Lake 10,563 acres of land are allocated for intensive recreation of which 5,507 acres will be developed by the Corps at 36 public use areas (2) and 5,055.9 acres will be developed by the OLRA at two state parks (Table D.27.2). The Corps has invested (as of 31 December 1973) \$2,609,900 for recreation facilities at 25 developed and 4 partially developed public use areas (9), with 7 additional areas scheduled for future development (2). Future public use areas will require cost-sharing although the ability of communities and counties within the Eufaula Lake region to cost-share is considered doubtful (2). Completed and partially completed areas may be expanded or completed without cost-sharing through 1980 (2). At the 36 public use areas, approximately 22% of the acreage is held in reserve for future development and approximately 66% of the acreage is allocated for general open space (2).

The Corps manages 24 of the developed public use areas which range from 5 to 575 acres (3) and include a total of 370 picnic tables, 244 camping spaces, and 28 lighted boat ramps. Of these Corps managed areas, 21 have picnic tables, 18 have camping spaces, 19 have lighted boat ramps and 4 have commercial concessions (2). User fees, ranging from \$1 to \$3 per site per night, were charged at five public camping areas in 1974 (10); fees were collected at 10 additional camping areas for 13 days in June of 1973 (3). User fees

Table D.27.2. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Eufaula Lake.

		Rental	al	Annual		Invest	ment	
Grantee	Instrument	Date	Date Term (yrs)	Rent Paid (\$)	Acreage	to 1974 (\$)	to 1974 Planned (\$)	
City of Eufaula	Lease	1965	50	0	111.0	N/Ab	N/A	
Oklahoma Lake Redevelopment Authority	Lease	1963	20	0	5,055.9	N/A	N/A	
Oklahoma Dept. of Wildlife Conservation	License	1973	25	ol	31,873.0	N/A	N/A	
Totals 3				0	37,039.9			16/10

<sup>a</sup>Tulsa District, Real Estate Division. 1974. Selected dump of outgrant master, Eufaula Lake. Tulsa, Oklahoma.

b Not available.

are collected by roving rangers during the heaviest recreation season (June through August) and are currently charged at the larger, heavily used, camping areas (10).

The condition of the Corps managed areas and facilities was excellent and adequately managed for prevention of facility and land-scape deterioration. Careful Corps selection of contractors for maintenance activities has resulted in adequate compliance with mowing and trash removal contracts at Eufaula Lake (9).

The OLRA has developed two state parks and lodges at Eufaula

Lake: Fountainhead and Arrowhead State Parks. Fountainhead State Park

consists of 2,853 acres leased from the Corps and 548 acres of state
owned land; Arrowhead State Park consists of 2,203 acres leased from

the Corps and 257 acres of state-owned land. A lodge and single
family cabins have been constructed on state purchased lands at each

park (3, 7). Facilities at both state parks include: a lodge, cabins,

golf course, airstrip, swimming beach, riding stable, individual

campsites, camping trailer facilities, boat ramp, marina, and grocery

store (1). Third party concessions operate the marina at each state

park.

OLRA maintenance and operation costs for fiscal 1974 were: \$143,867 at Fountainhead State Park (with a staff of 22 permanent and 8 temporary employees) and \$132,489 at Arrowhead State Park (with 20 permanent and 10 temporary employees) (11, 12). The condition of state recreation facilities and public use areas was good, although not as good as the condition of the Corps-managed areas.

One Corps developed area (111 acres) is leased to the city of Eufaula for use as a city park and fairgrounds (Table D.27.2). A third party commercial campground exists on the area along with picnic tables, boat ramps, and fair booths and buildings (1). The

area is poorly maintained and abused as indicated by the unmown picnic areas and broken picnic tables. The city has requested termination of the lease and the project engineer has indicated he would accept management responsibilities for the area to prevent further deterioration of the Corps investment (10). However, the Tulsa District favors retention of the lease agreement to reduce the Corps' management load (10).

The lease agreements for the four concession areas at Eufaula Lake (Table D.27.3) require a fixed payment or a combination of fixed plus graduated scale payment based on the percent of gross fixed assets plus a percent of concession profits. This arrangement has worked well throughout the district and particularly at Eufaula Lake where only two concessions have changed hands during 10 years of project operations (9). The concessions were clean and well maintained and they reportedly provided adequate services for the clientele using the lake (10).

Limited interest has been shown by quasi-public organizations for development of group recreation areas at Eufaula Lake. There are only two 25-year leases for two scouting groups on a total of 59 acres (Table D.27.4). Development at the sites include all-weather roads, tent platforms, restrooms, and water supplies (1).

The closeness of the large number of subdivisions situated around the project boundary encourages water related recreation as indicated by the granting of 363 dock permits (8). The Eufaula Lakeshore Management Plan and the Tulsa District recommend limiting to 475 the total number of dock facilities at the project due to a lack of personnel to administer and regulate these facilities (8, 9).

Table D.27.3. Outgrants for Recreation -- Commercial, Eufaula Lake.

Location	Grantee	Instrument		Rental		Annual		Inves	Investment	Turn-
			Date	Term (yrs)	Basis	Rent Paid (\$)	Acreage	to 1974 (\$) <sup>b</sup>	to 1974 Planned (\$)	overs
Belle Starr Park	Belle Starr Marina	Lease	1964	10	Fixed	915	18.2	660'99	N/A <sup>C</sup>	°
Porum Landing Henderson	Henderson	Lease	1970	4 1/3 Fixed	Fixed	200	10.3	62,753	N/A	-
Damsite (South)	Nabors	Lease	1970	20 1/2	Fixed+ Graduated	1,200 ed	16.1	175,188	N/A	0
Highway 9 Marina	A. Walker	Lease	1970	20 1/6	Fixed+ 3,799 Graduated	3,799	12.4	184,904	N/A	-
Totals (Current) 4	(t) 4	•				6,414	57.0	488,944		

Tulsa District, Real Estate Division, Management and Disposal Branch. 1974. Commercial outgrant lease agreements, Eufaula Lake. Tulsa, Oklahoma.

bersonal communication, 20 November 1974. Tulsa District, Real Estate Division, Management and Disposal Branch, Tulsa, Oklahoma.

GNot available.

Outgrants for Recreation -- Quasi-Public, Eufaula Lake. Table D.27.4.

			Rental		Current		Investment	ment	
Grantee	Instrument	Date	Term (yrs)	Basis	Annual Rent (\$)	Acreage	to 1974 Planned \$	Planned \$	
Boy Scouts of America	Lease	1964	25	q &N	0	36.0	N/A <sup>C</sup>	N/A	
Red Council	Lease	1965	25	<b>E</b>	01	23.0	N/A	N/A	has a
Totals 2					0	59.0	bara Seleta Besca		327 115

arulsa District, Real Estate Division, Management and Disposal Branch. 1974. Selected dump of outgrant master, Eufaula Lake. Tulsa, Oklahoma.

Not applicable.

CNot available.

The lake shore management plan will limit dock facilities by establishing areas that can support dock facilities and recommending removal and/or phasing out of those existing facilities which occur in areas not conducive for docks. The establishment of docking areas is based on nearness to existing and future public use areas, depth of the water, exposure of facilities to detrimental wind and wave action, access, and the relation these facilities will have on existing aesthetic quality (8). By restricting lake access and the number of dock facilities, the Corps is attempting to discourage shoreline development (2).

Visitation at Corps-managed areas was 4.5 million in 1973 (3) and was adequately handled by the public use areas and recreation facilities provided. However, some of the smaller areas are more intensively used than larger areas more capable of accommodating visitor pressure. For example, the public use area at Highway 9 Landing (215 acres) received an estimated 464,400 visitors in 1973 while Gaines Creek public use area (575 acres) received only an estimated 7,600 visitors (3). The Highway 9 Landing is directly adjacent to OK 9 which traverses the lake while the Gaines Creek area has poor access. Although access to recreational areas was good from state and federal highways, several county secondary access roads, were unpaved dirt and gravel roads. Much of the unpaved county road mileage is scheduled for paving and upgrading (10).

Visitation at the public use area managed by the city of Eufaula was estimated as 333,570 in 1973 (3). Fountainhead and Arrowhead State Parks received an estimated 355,820 and 268,610 visitors respectively in fiscal 1973 (11, 12).

#### 2. Lake Resources

The water quality in Eufaula Reservoir is good in the lower reaches, although the water in the upper reaches of the three major arms is poor. The waters of the Canadian River, the North Canadian River east of Oklahoma City, and the lower part of the Deep Fork River do not meet accepted state standards for municipal or domestic use (13). High mineral content, primarily sodium chloride from runoff of oil well waste, degrade these streams. Also natural salt formations occur upstream on the North Canadian and Canadian Rivers, providing a source of high mineral concentration when the river flows are reduced. The reservoir improves the water quality generally by mixing high flow, good quality waters with waters of low flow and poor quality (13).

Waste water from the municipal and industrial waste-disposal plants concentrated at Oklahoma City contribute to the turbidity and degradation of Eufaula Lake tributaries; lake water is brownish to reddish in color (13). However, sewage treatment by surrounding towns and communities is considered good to adequate with most disposal by septic tank. Sewage disposal is not a current or anticipated problem at the project. Under contract, the Corps' vault units are periodically emptied and the sewage deposited in nearby municipal treatment plants where secondary treatment is provided (2).

Due to the high mineral content, no waters from the lake are currently utilized for irrigation (10). The further upstream from the dam the less suitable for irrigation the waters become. The only tributary with waters suitable for irrigation is Deep Fork River which is rated only fair (13).

The U. S. Public Health Service considers waters suitable for municipal use that do not exceed 500 parts per million dissolved solids

(13). Waters in the lower third of the reservoir are rated good for municipal use but the remainder of the reservoir is rated only fair to poor (13). Currently 11 water supplies are taken from the reservoir: two by Haskell County, two by Pittsburg County, one by Muskagee County, three by local towns, and three by private water supply companies. In addition, about 200 domestic users around the lake have obtained water withdrawal permits from the state and pipeline easements from the Corps (9).

Three daily water sampling stations are operated at the Eufaula project: one upstream, one downstream, and one at the dam (13). In addition, seven periodic water sampling stations are spaced along the arms and tributary rivers of the lake where monthly samples are collected (13); monthly tailwater samples are also taken (2).

Discharge at the Eufaula Dam is approximately 18,000 gallons per day, but may amount to 100,000 cubic ft per second in the Canadian River below the dam during flood conditions (2). Power pool elevation may vary between 565 and 585 ft msl but usually fluctuates between 577 and 587 ft msl (2). Pool fluctuations created by flood control regulation, coupled with wind and wave action, cause severe erosion of the sandy soil shoreline. Hardwood losses and pool encroachment on adjoining private subdivisions has resulted from this erosion (2, 10). Tree removal and rip-rap installation at public use areas are necessary for visitor safety and prevention of recreation facility deterioration (10).

The Oklahoma Department of Wildlife Conservation (ODWC), Fish Division conducted extensive lake and fishery studies in 1972 when poor fishing followed 5 years of excellent fishing. The report concluded that primary food production was limiting because of:

"fluctuating water levels, excessive water turbidity, the types of

bottom substrates, and lengthy periods of deep water anoxic conditions in summer" (14). Further, there was a lack of desirable game fish habitat that resulted in an imbalance between game fish and rough fish. Fish management programs were subsequently begun by biologists in the Central Region of the Fish Division in 1973 (14). Good coordination with the Corps has occurred during the first year of the management program, especially concerning the regulation of pool elevations during spawning periods (15).

Fish Division management techniques scheduled through 1978 include: establishment of feeding areas, introduction of game fish, introduction of forage fish, and selective fish kills. Rough fishes are currently too large to be preyed upon by game species; therefore, threadfin shad and menidia fingerlings are being stocked. Game fish introductions include largemouth bass, striped bass, and walleye. The 5-year management plan is estimated to cost \$661,305 of totally state appropriated funds (14).

Much of the area inundated by the reservoir was not cleared to reduce initial development costs and to enhance fish nutrients and habitat. The standing snags detract from the aesthetics of the lake and present a hazard to boaters (2).

#### 3. Wildlife

The ODWC has the authority and responsibility to preserve, manage, and regulate all resident fish and wildlife at Eufaula Lake (16). The USF&WS and the ODWC are responsible for conservation and management of all migratory birds at the project. As landowner, the Corps is responsible for compatible land use practices and wildlife habitat development to restore, improve, and preserve fish and wildlife (16).

The ODWC has a license for 16,000 acres of land and 15,873 acres of water (Table D.27.2) at the project, although the ODWC has not yet augmented existing management programs and practices (10). The area to be managed is called the Eufaula Game Management Area and consists of five units located at: Deep Fork, Mill Creek, Dutchess Creek, Longtown Creek, and Gaines Creek (17). Most of the wildlife habitat in all five units has limited carrying capacity caused by livestock overgrazing (17).

The Corps issues interim agriculture and grazing leases for those lands designated for wildlife habitat (and scheduled to be managed by the ODWC) (Table D.27.5). In fact, the majority of agriculture and grazing outgrants are for lands designated for wildlife management (9). The counties of McIntosh, Pittsburg, Latimer, and Okmulgee received a total of \$16,474 from the Corps for grazing leases on the Eufaula project during fiscal 1974 (18); this is 32% of the total receipts generated by the project for these counties (18).

Management techniques scheduled by the ODWC include: construction of dams, dikes, and levees for waterfowl ponds; installation of fences, signs, and boundary markers for delineation of wildlife areas and contiguous grazed private property; and herbaceous seed plantings and vegetation control for reestablishment of wildlife habitat (17). The management of the five units is scheduled from 1974 through 1979 at an estimated cost of \$154,900 for development and maintenance (17). Federal aid for development and operations at the game management area is \$22,149 during fiscal 1975 (19).

The Corps manages 18 units for wildlife on 17,059 acres at Eufaula Lake (16). However, 13 of the units include public use areas which comprise approximately one-half of the acreage allotted for wildlife (16). The public use areas are regarded as wildlife

Table D.27.5. Outgrants for Agriculture, Grazing, and Right-of-Way Purposes, Eufaula Lake.

Purpose	Grantee	Outgrants	Instrument	Rental	al	1973	Acreage	Inves	Investment ,
				Date	Term (yrs)	Rent Paid (\$)		to 1974 (\$)	Planned (\$)
Agriculture Summary	Summary	ы	Lease	1974	5	20,423	3,065.0	N/Ab	N/A
Grazing	Summary	116	Lease	1974	1 or 5	51,606	20,445.0	N/A	N/A
Right-of- Way	Summary	231	Easement	1961 to 5 to 1973 Perpe tual	5 to Perpe- tual	739	2,561.1	N/A	N N N
Totals		360				72,768	26,071.1		

Selected dump of outgrant 1974. a Tulsa District, Real Estate Division, Management and Disposal Branch. master, Eufaula Lake. Tulsa, Oklahoma.

b<sub>Not</sub> available.

sanctuaries by the district because they are interspersed among the game and wildlife management areas and because hunting is not allowed (2).

Overgrazing of the game and wildlife management areas currently limits food and cover plants (16). The Corps recognizes this problem and suggests altering grazing leases so that cattle stocking rates and grazing periods are stipulated (16). Tree planting and plowing around old fields (for fire prevention) are management techniques currently followed by the Corps at wildlife management areas (10).

#### 4. Other Land Use

The fee land acquisition policy for Eufaula Lake resulted in only a narrow border of land above normal pool elevation around much of the lake. The land contiguous to the project has 136 platted subdivisions which vary from major subdivisions to mobile home parks (values from \$1,000 to \$93,000) [8]. The majority of these subdivisions are for seasonal occupancy and are situated overlooking the lake; they are also visible from the lake disrupting the scenic quality of the land-scape (2).

The counties encompassing and surrounding Eufaula Lake are in two OK planning districts: the Eastern Oklahoma Development District which includes McIntosh, Okmulgee, and Muskogee Counties; and the Kiamichi Economic Development District which includes Pittsburg, Haskell, and Latimer Counties (20). These districts have proposed land use, open space, and housing plans but lack manpower and direct police power to implement these plans (20).

Absence of strict zoning practices and coordinated land use plans is evidenced by the diverse mixture of housing and land use practices on the land surrounding the project. Real estate advertisements, many of which offer tracts of land for small down-payments and small monthly payments, were prevalent in the counties around the lake (10). Encroachment onto project lands results from improper private real estate advertisements (10) and insufficient Corps boundary marking (43% currently marked) (3). Where encroachments are detected, the Corps works with the landowner to eliminate the problem although some violators have been prosecuted (9).

The production of livestock and agricultural crops has historically been a basic source of income for the region surrounding Eufaula Lake. Recently the number of farms and acres planted for food crops has decreased but farm size has increased. The increase in beef cattle production is coupled with increased forest removal for pasture and increased feed crop production. The high demand for lands suitable for grazing and agriculture at Eufaula Lake is evidenced by the 13 agriculture leases on 3,065 acres and the 116 grazing leases on 20,445 acres (Table D.27.5). Table D.27.6 summarizes all outgrants on Eufaula Lake.

Currently, representatives from the Corps, Oklahoma Department of Agriculture, Forestry Division, and the USFS are preparing a resource protection and environmental improvement program (2). Vegetative management of public use areas should create a situation tolerant to inundation by flood waters, beneficial to wildlife, and capable of stabilizing shoreline soils (2). Removal of dead trees and planting of water-tolerant plants has occurred at Corps-managed public use areas (10).

The land acquisition policy allowed for the purchase or subordination of mineral rights at the project (1). However, the Eufaula Lake region is attractive for coal gasification plants due to the underlying strata of shale coal and the readily available water supply (2).

Table D.27.6. Summary of Outgrants, Eufaula Lake.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Recreation - Quasi Public	7	0	59.0	N/A
Recreation - Commercial	4	6,413	57.0	488,944
Fish and Wildlife and Recreation - Public Parks	æ	0	37,039.9	N/A
Agriculture, Grazing, and	360	72,768	26,071.1	N/A
kignt-or-way	ĺ			
Totals	369	79,182	63,226.0 <sup>b</sup>	

a Not available.

brotal exceeds Manageable Resource Lands (Table D.27.1) because some land reported as outgranted for fish and wildlife purposes is currently also reported as being outgranted for agriculture and grazing purposes. Archeological resources of the Eufaula Lake region were appraised in 1948 and 1950 by The Smithsonian Institution in cooperation with the University of Oklahoma. The region contains 118 known archeological sites including prehistoric Indian and historic Creek Nation sites. The lake has inundated 38 of these sites and shoreline erosion threatens 24 others. Lack of state funding in lieu of priority projects restricts excavation of these sites; however, a site examination by the Oklahoma Historic Society will precede future major Corps construction projects (2).

#### 5. Resource Use Controls

The resident engineer, GS-12, supervises the operations at Eufaula Lake and Lake Wister, a small Corps flood control project about 40 mi southeast of the Eufaula Resident Office. There are three sections (powerhouse, administrative, and reservoir management) at Eufaula with a total staff of 51 full-time and 12 temporary employees. At Lake Wister a separate project manager, GS-9 park manager, supervises project operations with one temporary and five full-time employees (21).

The Reservoir Management Section is headed by the assistant resident engineer, GS-11 park manager, and has a staff of 4 full-time park rangers (designated park managers by the district), 11 temporary trainee park rangers (designated park technicians by the district), and 34 supportive personnel. This section is responsible for all project operations and for maintenance outside the powerhouse (21).

In the District Operations Division, the Reservoir Branch mainly supervises project operation and maintenance in conjunction with the Office Operations Branch (22). The Management and Disposal Branch, Real Estate Division is directly responsible for the outgrants at Eufaula Lake. Inspections of outgrants are made by the project park ranger force; the district is responsible for policy changes and

outgrant cancellations (22). The Planning, Program Development, and Design Branches of the Engineering Division are directly responsible for project development including the establishment of sites for public use areas and wildlife management lands. The Environmental Resources Section, Planning Branch develops land use allocations for recreation, wildlife, and natural areas at the project in relation to anticipated environmental impacts (21). Refer to Figure D.27.2 for interrelationships of recreation-resource management affecting Eufaula Lake.

GS-13 GS-13 GS-13 GS-13 GS-13 Management and Disposal Branch Figure D.27.2. Recreation-Resource Management Interrelationships - Tulsa Engineer District Planning and Control Branch DISTRICT ENGINEER Real Estate Division Acquisition Branch Supv Realty Spec Appraisal Branch Supv Realty Spec Supv Realty Spec Supv Appraiser Realty Officer GS-15 GS-13 GS-14 Environmental Resources Section Program Development Branch Supv Outdoor Rec Plnr 1 Supv Outdoor Rec Plnr Engineering Division Biologist Supv Civil Eng Archeologist Planning Branch Supv Civil Eng Supv Civil Eng Supv Civil Eng

GS-13 GS-12 GS-12 GS-11 GS-7 GS-7 GS-4 GS-4 GS-12 GS-11 GS-9 GS-7 GS-7 GS-5 GS-5 GS-5 GS-3 GS-3 GS-14 GS-13 Office Operations Branch 1 Park Mgr 1 Clerk-Steno 1 Eng Draftsman (Temp) 1 Clerk-Typist Supv Civil Eng
2 Civil Eng
1 Outdoor Rec Plnr
1 Civil Eng Tech
1 Gen Clerk
1 Civil Eng Clerk
1 Civil Eng Clerk
2 Prog Clerk
5 Park Tech (Temp)
1 Clerk-Steno Operations Division Supv Electrical Eng Hydro-Power Branch Supv Civil Eng 1 Biologist 2 Civil Eng (IV) 3 Civil Eng 1 Park Mgr Reservoir Branch Supv Civil Eng Clerk-Typist GS-12 GS-11 GS-9 GS-4 GS-4 GS-3 Realty Management Section Supv Realty Spec
1 Realty Spec (V)
5 Realty Spec
1 Realty Clerk (Typing)
1 Realty Clerk (Steno)
2 Clerk-Steno 68-13 68-12 68-12 68-12 68-11 68-11 68-9 68-9 68-7 68-7 68-7 68-7 68-7 68-7 68-7 2 Landscape Arch
2 Civil Eng
2 Biologist
1 Civil Eng
1 Carto Tech
1 Carto Tech
1 Biologist (Temp)
1 Biologist (Temp)
1 Civil Eng Tech
1 Carto Tech
1 Carto Tech
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1 Lator Accompany
2 Carto Tech
3 Carto Tech
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6 Carto Tech
7 Carto Tech
8 Carto Tech
8 Carto Tech
9 Carto Tech
1 Clerk-Steno

Eufaula Area Field Office

### III. KEY FINDINGS

## A. Recreation

- 1. Recreation is not an authorized project purpose; however, extensive public use and access areas have been established. The Corps has developed 21 recreation areas on 5,165 acres and operates and maintains 20, four of which have commercial concession leases. One area (111 acres) is outgranted to the city of Eufaula. The OLRA has developed two lodges with associated facilities on 5,056 acres leased from the Corps plus additional lands owned in fee by the state.
- 2. Planning for public use areas has resulted in the designation of large tracts for development of intensive recreation facilities where access is limited and smaller tracts for less intensive development where access is good. The areas with the best access receive the greatest use, occasionally to the point of overcrowding, while areas with restricted access receive only limited use. Public use areas were developed to accommodate an estimated 10 million visitors during the tenth year of operation; visitation estimates for 1973, the ninth year of operation, were 4.5 million.
- 3. The maintenance at Corps-managed areas was excellent but maintenance at the state parks was poor. The area leased to the city of Eufaula was poorly maintained and Corps-constructed facilities were deteriorating.
- 4. The city of Eufaula has found operation and maintenace of the leased area financially burdensome and has requested termination of the agreement. The resident engineer would accept the operation and maintenance of the area; however, district policy favors the outgrant arrangement.

5. The facilities and aesthetic characteristics provided at Eufaula Lake are not unique to the state; six other flood control lakes are built on tributary rivers of the Arkansas River. However, Eufaula Lake is the most accessible major recreation lake to Oklahoma City, the largest urban center in the state.

## B. Fish and Wildlife

- 1. The Corps has assumed direct responsibility for the project's wildlife and timber resources. The ODWC has a license for wildlife management on 31,873 acres of project land but is not managing the area currently due to funding shortages. The ODWC, Fish Division, manages the reservoir fishery.
- Corps wildlife management practices include tree planting and plowing around old fields (for fire prevention). These practices have improved wildlife habitat at the project.
- 3. The 31,873 acres of land licensed to ODWC is grazed under interim leases issued by the Corps. This collateral land use is inconsistent with the master plan. Both habitat and wildlife species suffer since carrying capacity is not defined.
- 4. Many forested areas on the various arms of the lake were not cleared to provide fish nutrients and habitat after reservoir construction.
- 5. After 5 years of excellent fishing, fish production suddenly dropped off. Extensive fishery studies conducted by the ODWC, Fish Division, revealed that primary food production was limited because of the timing of water fluctuations, excessive turbidity, bottom substrate composition, and lengthy periods of deep water anoxic conditions in the summer. Management techniques by the Fish Division and better cooperation from the Corps (concerning the

timing of pool fluctuations during fish spawning seasons) are improving fish production.

# C. Corps and Contiguous Land Use

- 1. The land acquisition policy at the Eufaula Lake project was not sufficient to maintain an aesthetic appearance around the lake. A small fringe of property was acquired surrounding the lake with some larger supplemental tracts acquired for recreation area development. Flowage easements were obtained on private lands contiguous to Corps property thus buffering project lands. However, encroachment onto easement acreage is occurring and the Corps is prosecuting offenders.
- 2. One hundred thirty-six subdivisions and trailer parks are built on private lands abutting the Corps' boundary. These developments offer views of and are visible from the lake. The possibility for increased numbers of housing subdivisions, which will reduce the aesthetic quality of the lake, is immediate as evidenced by the numerous real estate advertisements offering property around the lake.
- 3. The Corps has drafted a Lakeshore Management Plan for Eufaula Lake that covers fee-owned lands within the project. The establishment of floating facilities by private landowners will be restricted. The plan delineates all project lands for: project management, intensive recreation, low density recreation, natural areas, and wild-life management. The plan should limit subdivision development on contiguous lands by restricting lake access.
- 4. Regional economic development districts have proposed land use, open space, and housing plans. However, these districts lack adequate staff and police power to implement the proposed plans. The diverse mixture of housing and land use practices on land surrounding the project reflect the absence of both strict zoning practices and coordinated land use planning by the local governments.

5. Water supply and irrigation are not authorized project purposes at Eufaula Lake. However, waters from the lake are currently withdrawn by 11 public water suppliers and 200 private households and irrigation potential is suggested in regional water resources appraisals.

## D. Real Estate Programs and Practices

- 1. Lands designated for wildlife management are currently outgranted for agriculture and grazing purposes. Overgrazing has cuased
  a reduction of carrying capacity and deterioration of wildlife habitat
  on Corps-managed lands and lands licensed to the ODWC for wildlife
  management. To guard against continued abuse of lands outgranted for
  agriculture and grazing purposes, future leases will contain limitations
  of crop harvests and restrictions on grazing periods.
- 2. Counties surrounding the lake support the Corps' agriculture and grazing program since they receive 75% of the revenue derived from these activities.
- 3. Increasing demands by private land owners for shoreline recreation facility permits are restricted by compliance with the Lakeshore Management Plan.

#### E. Corps Organization

- 1. There are not enough Corps personnel with biological expertise to establish the specific needs for wildlife enhancement, to allocate carrying capacity between domestic animals and wildlife, to contribute to the management plans followed by ODWC, and to redeem Corps responsibility for wildlife enhancement on project lands.
- 2. Planning for recreation and wildlife is done by personnel in the Environmental Resources Section, Planning Branch, Engineering Division. The section is staffed with three biologists (GS-9, GS-12),

two outdoor recreation planners, two landscape architects, five civil engineers, one archeologist, and seven supportive personnel. The section chief is a GS-13 outdoor recreation planner.

- 3. Management of recreation and wildlife resources is primarily in the Reservoir Branch, Operations Division. The staff is composed mostly of civil engineers. The branch has two park managers and one biologist. Grades range from GS-7 to GS-13; the biologist is a GS-12.
- 4. Decisions relative to Corps outgrants are made in the Management and Disposal Branch, Real Estate Division. Although inspections and field decisions are made by park rangers at the project, cancellations of lease agreements are made by the district.
- 5. Supervision of Eufaula Lake and Wister Lake is by the resident engineer, GS-12, stationed at Eufaula Lake. At Eufaula Lake, the assistant resident manager is a GS-11 park manager who heads Reservoir Management; at Wister Lake, a smaller reservoir project, the project manager is a GS-9 park manager.
- 6. Management at Eufaula Lake is accomplished primarily by park rangers identified as park managers and park technicians in the district organization charts. Four full-time rangers (GS-5 to GS-11) supervise 11 trainee park rangers (GS-4).
- The Ranger Trainee Program has successfully developed personnel to serve as recreation-resources managers.

#### F. Environmental Problems

1. Natural salt deposits and brine from oil well waste drain into the tributary rivers of Eufaula Lake causing a high mineral content in the water. Although the waters of the lake are classified as poor for water supply and have too high a mineral content for irrigation; 11 town and community water supplies and over 200 private households remove water from the lake.

- 2. Turbidity of the water in the lake detracts from the aesthetic quality of the project and seriously reduces fish spawning success. Primarily the result of wind and wave action on the shallow lake bottom, turbidity is also increased by waste waters from municipal and industrial waste-disposal plants (concentrated at Oklahoma City) that flow into lake tributary rivers.
- 3. During periods of severe flood control, the pool inundates parts of the public use areas where hardwoods are killed and excessive shoreline is eroded. After the pool recedes, removal of dead trees and replacement of landscape present additional maintenance duties.

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# 28. ROBERT S. KERR LOCK AND DAM AND RESERVOIR Southwest Division Tulsa District Oklahoma

## I. SETTING

## A. Location

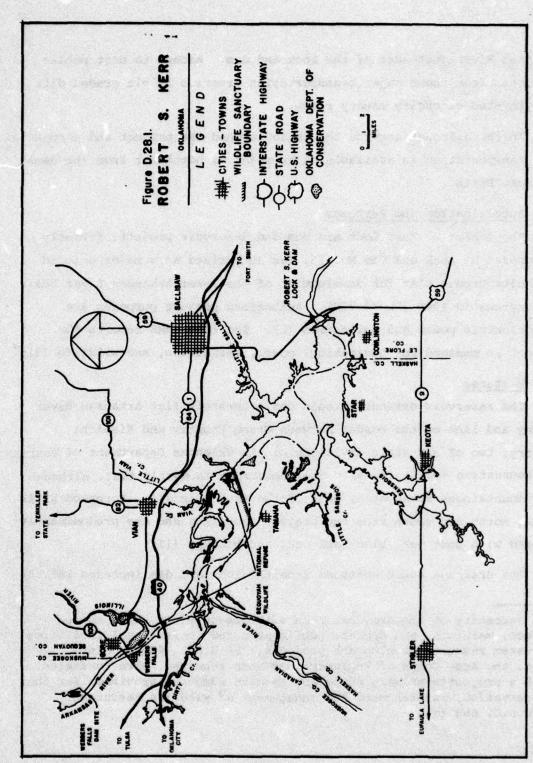
The Robert S. Kerr Lock and Dam are located in eastern Oklahoma on river mile (mi) 395.4 of the Arkansas River (1) about 20 mi west of the OK-Arkansas border and 165 mi east of Oklahoma City. The reservoir extends generally west-northwest from the dam 37 mi into portions of Sequoyah, Muskogee, LeFlore, and Haskell Counties (1). Arms of the reservoir from an irregular 250 mi shoreline (2) and extend up the tributaries of: Sanbois Creek, Little Sanbois Creek, Canadian River, Dirty Creek, Illinois River, Vian Creek, Little Vian Creek, and Little Sallisaw Creek.

Access to the lake is good along the northern region of the project where U. S. 64-OK l and I 40 parallel the river valley and cross the project at two locations in the upper reaches of the reservoir.

Interstate 40 is the major east-west transportation route through the state and connects Oklahoma City and Fort Smith to the project. Sallisaw, Vian, Gore, and Webbers Falls are local towns situated along U. S. 64-OK l with direct access to the project (Figure D.28.1).

Connecting the towns of Stigler and Keota to the southern region of the project OK 9 continues 20 mi west to the Eufaula Lake project.

As the major route for access to many public use areas, U. S. 59 extends north-south across the eastern region of the project and crosses the



D.28.2

Arkansas River just east of the lock and dam. Access to most public use areas from these major transportation arteries is via graded dirt and graveled secondary county roads.

Three railroads service the region around the project and commercial air transportation is available at Tulsa (84 mi northwest from the dam) and Fort Smith.

# B. Authorization and Purposes

The Robert S. Kerr Lock and Dam and Reservoir project, formerly designated as Lock and Dam No. 15, was authorized as a major unit in the multipurpose plan for development of the lower Arkansas River Basin by Congress in 1946 (PL 79-758). Authorized project purposes are hydroelectric power and navigation (2). The 1973 RRMS reports the project is managed for navigation, power, recreation, and wildlife (3).

# C. Features

The reservoir extends through the moderately flat Arkansas River Valley and lies on the border between Green Country and Kiamichi Country, two of six state divisions of the Oklahoma Department of Tourism and Recreation (ODTR) (4, 5). The topography is mostly flat, although some mountainous areas occur east of the reservoir (1). Forested hills extend north and south from the project shoreline and are predominantly covered with post oak, blackjack oak, and hickory (1).

The drainage basin upstream from the lock and dam includes 147,756

The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663 (a).

square mi of northeastern and north-central OK and annually deposits 11 million tons of naturally suspended sediments in the Kerr Reservoir (1). Maintenance dredging maintains the channel at elevation 455 feet mean sea level (fts msl) (1). Navigation channel maintenance is required along the entire Arkansas River navigation project which extends upstream from the mouth of the Arkansas River to Tulsa. There are four upstream locks and dams on the Arkansas River between the Kerr Dam and Tulsa; additionally there are 10 upstream flood control dams on tributary rivers and streams supplying the Arkansas River. The total project from Fort Smith to Tulsa is called the McClellan-Kerr Arkansas River Navigation System.

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The navigation-power pool at 460 ft msl forms an irregular reservoir of 42,000 acres with a storage capacity of 493,600 acre-ft (2). The navigation channel has a minimum depth of 9 ft and a minimum width of 250 ft, although the reservoir varies from 0 ft to 43 ft deep overall (1). The project is not operated for flood control (1).

The principal project features are: an earth-fill dam with 18 water release gates (44 ft by 50 ft), a single lift navigation lock (110 ft by 600 ft) with a normal lift of 40 ft, and four 27,500 kilowatt generators (2). Refer to Table D.28.1 for additional project features.

Table D.28.1. Resource Statistics, Robert S. Kerr.

Date of Authorization	1946 <sup>a</sup>
Rights in Land Acquired Between	1964 - 1970 <sup>b</sup>
Date of Impoundment	November, 1970 <sup>C</sup>
Date of Full Operation	December, 1970 <sup>C</sup>
Lake Size When Water Level is at:	
Maximum Pool (479.8 ft msl) <sup>a</sup>	60,235 acres <sup>d</sup>
Normal Power Pool (460 ft msl)	42,000 acresd
Normal Minimum Pool Elevation	NA <sup>e</sup>
Minimum Design Elevation	37,500 acres <sup>a</sup>
Water Fluctuation - Summer Recreation Season	2 feet <sup>a</sup>
Shoreline at Normal Pool	250 miles <sup>C</sup>
Held in Fee Simple by Corps	250 miles <sup>C</sup>
Land Area Managed by Corps	
Total Land in Project	65,706 acres <sup>d</sup>
Fee Title in U. S. 56,720 acres	
Easements to Flood 2,251 acres <sup>d</sup>	
Riverbed 6,735 acres <sup>d</sup>	
Project Operation Lands	472 acres <sup>d</sup>
Manageable Resource Lands	20,983 acres <sup>e</sup>

Tulsa District. 1965. Lock and Dam No. 15, Robert S. Kerr, design memorandum no. 4B, master plan. Tulsa, Oklahoma.

Personal communication, 23 October 1975. Tulsa District, Real Estate Division, Acquisition Branch, Tulsa, Oklahoma.

<sup>&</sup>lt;sup>C</sup>RRMS. 1973.

Tulsa District. 1973. Report on utilization of civil works lands and facilities (Robert S. Kerr Lock and Dam, Sallisaw, Oklahoma). Tulsa, Oklahoma.

Table D.28.1 (Continued).

eNot applicable.

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f Total Project Lands minus (Land Flooded at Normal Power Pool + Project Operation Lands + Easements).

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LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

## A. Analytic Unit

Portions of Sequoyah, Muskogee, LeFlore, and Haskell Counties, which surround the Kerr projects, directly affect and are influenced by the reservoir. A 10 mi zone around the reservoir includes all the major transportation arteries which traverse the region and connect the surrounding towns and communities to the project.

Sallisaw is the largest town (1970 population: 4,824) in the 10 mi zone around the lake and it receives extensive tourist business due to closeness of east-west transportation routes (6). The other towns around the project region are also located at major highway routes and interchanges (Figure D.28.1). The small Towns of Keota, Tamaha, and Webbers Falls are located on the shore adjacent the navigation channel and import and export bulk materials.

The region is predominantly rural with farming and beef production primary occupations. Mineral resources in the region are actively exploited and include: oil, gas, coal, glass sand, crushed aggregate, lime, and potteryclay. (6).

The recreation facilities at the Kerr Reservoir are used predominantly by people within the 10 mi zone. Urban populations, located at Fort Smith, Muskogee (40 mi northwest of the lake), and to a lesser extent Tulsa, contribute to the visitor pressures at the project. Public use areas were designed to accommodate visitor pressures within a 50 mi zone around the project (2).

Two Oklahoma Sub-state Planning Districts (Regions Two and Three) border the major portion of the Kerr project. Region Two (Eastern Oklahoma Economic Development District) includes Sequoyah and Muskogee

Counties; Region Three (Kiamichi Economic Development District) includes Haskell and LeFlore Counties. Water supply available for recreation is prevalent in both regions, however, income for the rural populace seems to limit recreation attendance and the degree of participation in recreational activities. (6).

Attendance at water related facilities in Region Three increased 85% between 1965 and 1970, but the attendance growth at water related facilities in Region Two increased only half the growth of Region Three. Although the population growth rates are equal, the per capita personal income increased 66% from 1960 to 1968 for Region Two, while the per capita personal income for Region Three during the same time span increased 107%. Region Three has realized greater increases in economic stability (per capita personal income) due to its association with the Ozark Regional Development Program; however, both regions are considerably below the average state per capita personal income (6).

## B. Ownership

### 1. Corps

The Corps acquired 56,720 acres in fee title and 2,251 acres in flowage easement at the Kerr project. With the addition of 6,735 acres of navigational servitude (original river channel), the total project is 65,706 acres (Table D.28.1). The guideline for land acquisition was the 463 ft msl contour or the envelope curve of backwater effects after 50 years of sedimentation, whichever was higher. This provided a minimum horizontal distance of 300 ft from the normal pool elevation (460 ft msl) except where flowage easements were purchased (1). The fee lands cost \$207 per acre on the average and the flowage easement cost averaged \$179 per acre based on acreages acquired through June 1974 (7).

There are 21,455 acres of usable land above the normal navigation-

power pool that have been allocated for: project operations (472 acres), public use, wildlife management, and nonzoned (natural) areas (8).

## 2. Municipal

The Towns of Webbers Falls, Tamaha, and Keota border the reservoir shoreline (Figure D.28.1). Two commercial ports exist along the reservoir, Sierra Coal near Webbers Falls and Port Carl Albert on Sans Bois Creek near Keota (9). Increased navigation on the Arkansas River has directly influenced the growth of these two ports.

# C. Resource Management

## 1. Recreation

At the Kerr project, 4,252 acres at 11 public use areas have been developed by the Corps including a 2-acre overlook, a visitor center at the lock, and nine water-oriented recreation areas ranging from 64 to 1,774 acres (3). There is a boat launching ramp at each of the nine areas; picnicking is at eight areas with a total of 215 sites; camping is at six areas with a total of 217 sites; and group camping is at five areas (3). The Corps manages 10 of these public use areas and the USF&WS manages the 133-acre public use area developed within the Sequoyah National Wildlife Refuge (NWR) at Vian Creek; this area has 24 picnic sites and 1 boat launching ramp (3). The Corps investment, for recreation facilities developed through December 1973 was \$1,408,000 (10).

One other Kerr Reservoir public use area is developed and managed as a city park by the City of Webbers Falls (2). This 8-acre park (3) is adjacent to the town and includes a surfaced access road, parking area, and boat launching ramp permitted from the Corps (2). The Town of Tamaha has requested the development of an adjacent recreation area, but the Corps has delayed action because of foreseeable financial

problems with maintenance (11).

The master plan designates four commercial concession sites at public use areas around the reservoir but currently only one operation (located on 28 acres at Applegate Cove) has been established (Table D.28.2). The concessioner uses paved access roads, a boat launching ramp, and rest rooms developed by the Corps and provide sales, services, and rentals on boats, motors, boat storage, and related boating equipment (10). The concessioner has developed boat storage facilities, service docks, sewage disposal systems, and camper facilities at an estimated cost through December 1973 of \$107,039 (10).

Corps-managed facilities and public use areas were effectively maintained for prevention of facility and landscape deterioration. Bidders for trash removal and mowing contracts at the project are thoroughly investigated by the district (10). Contract compliance is good as evidenced by the clean and orderly condition of the public use areas. The public area at Vian Creek receives extensive use by hunters and fishermen and is poorly maintained by the USF\$WS (11).

User fees are collected at five public use areas by roving rangers. The basic camping fee is \$2 per night with an additional \$0.50 charge for electrical hookup. The largest public use area, Sallisaw Creek (1,774 acres), does not require a user fee (11).

In 1973 an estimated 680,700 visitors used the Kerr Reservoir facilities (3) which was below the expected visitation rate of one million (1). Unusually rainy weather throughout the year contributed to a lower visitation rate than in 1972 although the public use areas at Kerr Reservoir were not inundated by flood waters (11). The visitation at the Sequoyah NWR in 1973 was estimated at 72,100 (3). Because of the exceptionally good trout fishing on the Illinois

Table D. 28.2. Outgrants for Recreation -- Commercial, Robert S. Kerr.

4				Renta	1	6000000		Inve	stment	
Location Grantee		Instrument	Date	Term (yrs)	ent Date Term Basis (yrs)	Rent Paid Acreage (\$)	Acreage	to 1974 (\$)	to 1974 Planned (\$)	Turn- over
Applegate Cove	Applegate Barnes, Barnes Cove Shartel, & Shartel	Lease		20	1972 20 Fixed + Graduated	652	28.0	107,039 N/Ab	N/Ab	0

Personal communication, Actober-November 1974. Tulsa District, Real Estate Division, Management and Disposal Branch, Tulsa, Oklahoma.

b<sub>Not</sub> available.

River, the small public use area (64 acres) located there receives overuse from fishermen using the river access (11).

Four areas comprising 69 acres are designated for quasi-public use at the project but none are currently leased. There was no acreage designated for nonprofit membership agencies or private recreation groups at the project (1).

## 2. Lake Resources

Sediment retention, by the Kerr and upstream dams, has replaced a muddy stream fishery of mostly nongame fish species with a less turbid reservoir fishery that supports a variety of game fish species. In the Kerr Reservoir the annual sediment load was 95 million tons prior to construction of the Webbers Falls Lock and Dam (immediately upstream from the Kerr Reservoir on the Arkansas River); the current Kerr Reservoir sediment load is 11 million tons annually. Currently waters from the reservoir are not used for water supply or irrigation (1).

Because the reservoir is shallow (average depth 10 ft) except in the river channel, wind and wave action over the large water surface cause considerable shifting of reservoir bottom materials and erosion along the shoreline. In addition coal dust from two coals loading ports along the reservoir combine with silt and restrict phytoplankton production. Shoreline erosion due to pool fluctuations will be minimal since periodic power generation drawdowns are only 2 ft (1).

Management of the reservoir fishery is the responsibility of the Oklahoma Department of Wildlife Conservation (ODWC), Fish Division (12). The reservoir lies in the Northeast Region of the Fish Division which have offices in Muskogee. Fish production in the reservoir and particularly in the Illinois River is good with an estimated 1.2 million

pounds of sport fish harvested in 1973 (9). The reservoir has warm temperatures conductive for the production of walleye, largemouth bass, and crappie with an estimated carrying capacity of 600-800 pounds of fish per acre (12). Clear, cold waters in the Illinois River provide habitat for trout released from the ODWC's hatchery located on the river below the Tenkiller Ferry Dam (12). Although sport fishing is extensive in the reservoir, commercial fishing is not allowed (9, 11).

Techniques employed at the reservoir for fish habitat improvement include: rip-rap installation and dike construction to reduce erosion and turbidity, restrictions on floating facilities in coves where good fish habitat exists, and improvement or abandonment of back roads to avoid excessive sedimentation. The ODWC has stocked the reservoir with largemouth bass, channel catfish, and walleye. In addition, striped bass stocked in Keystone Lake (a Corps flood control project upstream from Kerr Reservoir) have become established in the Kerr Reservoir (13). Cooperation between ODWC and the Corps has been good concerning pool levels during spawning periods (13). One problem in the reservoir is the growth of Eurasion watermilfoil encouraged by the stable warm water levels; growth has not yet affected navigation or fish populations but close inspection is warranted by the ODWC and the Corps (13).

#### 3. Wildlife

The USF&WS has license for 20,800 acres of land and water at the Kerr project for the Sequoyah NWR (Table D.28.3). The ODWC is scheduled to license 1,609 acres of land for wildlife managment at the project. There are an additional 10,790 acres of project lands managed by the Corps for wildlife (12).

Outgrants for Fish and Wildlife and Recreation -- Public Parks, Robert S. Kerr. Table D. 28.3

		Rental	a.	Annual		Investment	tment	
Grantee	Instrument	Date	Term (yrs)	Paid (\$)	Acreage	to 1974 (\$)	Flanned (\$)	
U.S. Dept. License of Interior	License	1970	Indef.	0 10 10 10 10 10 10 10 10 10 10 10 10 10	20,800.0	N/A <sup>b</sup>	N/A	

of outgrant master Selected dump Robert S. Kerr Lock and Dam. Tulsa, Oklahoma 1974. Arulsa District, Real Estate Division.

bnot available.

The Sequoyah NWR was established, through cooperative agreement between the USF&WS and the Corps, as mitigation for waterfowl habitat lost during project construction (2). Sharecropping has provided abundant waterfowl food that is extensively used; the estimated maximum numbers of ducks and geese present in 1973 were 258,500 and 4,535 respectively (9).

Fishing is allowed on the reservoir waters within the refuge and hunting is allowed on 9,760 acres at three areas (43% of the refuge) (2). Areas closed to hunting are designed to provide waterfowl resting and feeding areas. Hunting and fishing are allowed elsewhere on the project excluding recreation areas, project operation areas, and an additional 70 acres of land near Applegate Cove designated for the "Acres of Wildlife" program of the ODWC (2).

The land requested by the ODWC for the proposed Robert S. Kerr Game Management Area includes many islands within the reservoir that provide good goose habitat. The ODWC has submitted management programs to the Corps which include: fence and road construction, boundary marking, sharecropping of grains for goose food, and hunting blind construction. Fishing will be allowed throughout the year on the management area and hunting will be allowed on a first come first served basis. The projected first year development cost at the management area is \$18,000 (14).

The Corps is preparing a management program for Corps-managed wildlife lands at the Kerr project which will include: habitat plantings, boundary marking, nature trail construction, vegetation and pest control, and half the services of a GS-9 wildlife biologist. Four management units east of the Sequoyah NWR are proposed in the plan at an iritial cost of \$384,000. Wildlife to be managed includes mostly game animals (gray and fox squirrels, cottontail rabbits, Bobwhites, white-tailed deer, other furbearers, and waterfowl). Hunting is

currently allowed on these areas and will be continued after initiation of the management plan (12).

Currently those lands designated for wildlife management (in the master plan) or licensed to the ODWC are interimly outgranted for agriculture and grazing purposes (8). Some cases of overgrazing exist and the potential for extensive overgrazing is great; therefore, the Corps is revising leases to incorporate limitations on stocking rates, grazing periods, and cancellations of leases on overgrazed areas (12). Agricultural leases are considered a management tool for wildlife because normally 40% of the harvest is left standing in the field for wildlife food (12).

#### 4. Other Land Use

The land acquisition policy for the Kerr project generated a narrow border of land around the reservoir shoreline. Land contiguous to the project boundary is privately owned and used mostly for agriculture, grazing, and timber. Subdivision development, including mobile homes on individually owned lots, exists around the project but to a limited degree (9). However, construction of the project is relatively recent and future development is expected (9). Currently the project exists in a predominantly rural and aesthetic setting.

Two State planning districts encompassing the Kerr project have proposed land use, open space, and housing plans but lack the manpower and direct influence to implement the plans (16). The Kerr project is considered an integral part of these plans but without strict zoning practices and land use plans, the project could receive extensive development uncomplimentary to the aesthetics of the lake.

Agriculture and grazing leases on project lands generated \$7,922 in 1973 (Table D.28.4). The majority of the leases occurred on lands within Sequoyah and Haskell Counties; 75% of the revenue from Corps agriculture

Table D.28.4. Outgrants for Agriculture and Grazing Purposes, Robert S. Kerr.

Term         Paid         Acreage         to 1974           (yrs)         (\$)         (\$)           4         138         165.0         N/A           4.25         165         115.0         N/A           2         70         19.0         N/A           4.25         600         121.9         N/A           5         335         55.0         N/A           2         335         55.0         N/A           4.25         700         150.0         N/A           4.25         40         10.0         N/A           4.25         310         177.0         N/A           4.25         200         40.0         N/A           1         650         115.39.8         N/A           1         4,226         1,539.8         N/A           1         7,922         2,625.7         N/A					Rental	1	Annual		Inve	Investment
R. Harkey         1         Lease         1972         4         138         165.0         N/A b           C. K. Hudson, Jr.         1         Lease         1970         4.25         165         115.0         N/A b           C. K. Hudson, Jr.         1         Lease         1973         2         70         19.0         N/A b           J. I. Matthews         1         Lease         1970         4.25         600         121.9         N/A b           B. R. Pearson         1         Lease         1970         4.25         700         18.0         N/A b           W. Pearson         1         Lease         1970         4.25         700         150.0         N/A b           C. E. Sloan         1         Lease         1973         2         63         10.0         N/A b           A. Speck         1         Lease         1970         4.25         40         40.0         N/A b           C. S. Uptergrowe         1         Lease         1970         4.25         310         N/A b           F. Wood, III         1         Lease         1970         4.25         200         40.0         N/A b           Summary         37	Purpose		Outgrants	Instrument	Date	Term (yrs)	Paid (\$)	Acreage	to 1974 (\$)	Planned (\$)
R. Harkey         1         Lease         1970         4.25         165         115.0         N/A           C. K. Hudson, Jr.         1         Lease         1973         2         70         19.0         N/A           H. J. Matthews         1         Lease         1970         4.25         600         121.9         N/A           B. R. Pearson         1         Lease         1970         4.25         700         18.0         N/A           W. Pearson         1         Lease         1970         4.25         700         150.0         N/A           C. E. Sloan         1         Lease         1973         2         63         N/A           A. Speck         1         Lease         1970         4.25         40         N/A           C. S. Uptergrove         1         Lease         1970         4.25         40         N/A           F. Wood, III         1         Lease         1970         4.25         20         40.0         N/A           Summary         37         Lease         1970-1974         1-4.25         2.226         115.0         N/A           Summary         50         1.25         2.226         1.539 <td>Agriculture</td> <td>G. Haraway</td> <td>1 1</td> <td>Lease</td> <td>1972</td> <td>4</td> <td>138</td> <td>165.0</td> <td>N/Ab</td> <td>N/A</td>	Agriculture	G. Haraway	1 1	Lease	1972	4	138	165.0	N/Ab	N/A
C. K. Hudson, Jr.       1       Lease       1973       2       70       19.0       N/A         H. J. Matthews       1       Lease       1970       4.25       600       121.9       N/A         J. I. Matthews       1       Lease       1973       2       100       18.0       N/A         B. R. Pearson       1       Lease       1970       4.25       700       150.0       N/A         B. E. Peaster       1       Lease       1973       2       63       10.0       N/A         C. E. Sloan       1       Lease       1970       4.25       40       N/A         A. Speck       1       Lease       1970       4.25       40       N/A         C. S. Uptergrove       1       Lease       1970       4.25       40       N/A         F. Wood, III       1       Lease       1970       4.25       200       40.0       N/A         Summary       37       Lease       1970-1974       1-4.25       4,226       1,539-8       N/A         Sommary       37       Lease       1970-1974       1-4.25       2,220       1,539-8       N/A         Sommary       50       7,922 </td <td></td> <td>R. Harkey</td> <td></td> <td>Lease</td> <td>1970</td> <td>4.25</td> <td>165</td> <td>115.0</td> <td>N/A</td> <td>N/A</td>		R. Harkey		Lease	1970	4.25	165	115.0	N/A	N/A
H. J. Matthews 1 Lease 1970 4.25 600 121.9 N/A J. I. Matthews 1 Lease 1973 2 100 18.0 N/A B. R. Pearson 1 Lease 1970 5 335 55.0 N/A W. Pearson 1 Lease 1970 4.25 700 150.0 N/A C. E. Sloan 1 Lease 1973 2 63 10.0 N/A A. Speck 1 Lease 1970 4.25 40 40.0 N/A C. S. Uptergrove 1 Lease 1970 4.25 40 40.0 N/A F. Wood, III 1 Lease 1970 4.25 200 40.0 N/A E. J. Terrill 1 Lease 1970 4.25 200 40.0 N/A Summary 37 Lease 1970-1974 1-4.25 4,226 1,539.8 N/A Summary 50 Rease 1970-1974 1-4.25 4,226 1,539.8 N/A		C. K. Hudson, Jr	н	Lease	1973	7	70	19.0	N/A	N/A
J. I. Matthews       1       Lease       1973       2       100       18.0       N/A         B. R. Pearson       1       Lease       1970       5       335       55.0       N/A         W. Pearson       1       Lease       1970       4.25       700       150.0       N/A         C. E. Sloan       1       Lease       1973       2       63       100.0       N/A         A. Speck       1       Lease       1970       4.25       40       40.0       N/A         C. S. Uptergrowe       1       Lease       1970       4.25       310       177.0       N/A         F. Wood, III       1       Lease       1970       4.25       200       40.0       N/A         Summary       37       Lease       1970-1974       1-4.25       4,226       1,539.8       N/A         Sommary       50       1       650       1,539.8       N/A		H. J. Matthews	7	Lease	1970	4.25	009	121.9	N/A	N/A
B. R. Pearson         1         Lease         1970         5         335         55.0         N/A           W. Pearson         1         Lease         1970         4.25         700         150.0         N/A           E. E. Peaster         1         Lease         1973         2         63         100.0         N/A           A. Speck         1         Lease         1970         4.25         40         40.0         N/A           C. S. Uptergrove         1         Lease         1970         4.25         310         177.0         N/A           F. Wood, III         1         Lease         1970         4.25         200         40.0         N/A           Summary         37         Lease         1974         1-4.25         4,226         1,539.8         N/A           Summary         37         Lease         1970-1974         1-4.25         4,226         1,539.8         N/A           Summary         50         2,226         2,625.7         N/A		J. I. Matthews		Lease	1973	7	100	18.0	N/A	N/A
W. Pearson         1         Lease         1970         4.25         700         150.0         N/A           E. E. Peaster         1         Lease         1973         2         63         60.0         N/A           C. E. Sloan         1         Lease         1970         4.25         40         40.0         N/A           C. S. Uptergrove         1         Lease         1970         4.25         310         177.0         N/A           F. Wood, III         1         Lease         1970         4.25         200         40.0         N/A           Summary         37         Lease         1970-1974         1-4.25         4,226         1,539-8         N/A           Sommary         50         37         1,523-8         N/A         N/A		B. R. Pearson		Lease	1970	2	335	55.0	N/A	N/A
E. E. Peaster       1       Lease       1973       2       60.0       N/A         C. E. Sloam       1       Lease       1973       2       63       10.0       N/A         A. Speck       1       Lease       1970       4.25       40       40.0       N/A         C. S. Uptergrowe       1       Lease       1970       4.25       310       177.0       N/A         F. Wood, III       1       Lease       1970       4.25       200       40.0       N/A         Summary       37       Lease       1970-1974       1-4.25       4,226       1,539.8       N/A         Sommary       50       37       1,539.8       N/A		W. Pearson	-1	Lease	1970	4.25	200	150.0	N/A	N/A
C. E. Sloan       1       Lease       1973       2       63       10·0       N/A         A. Speck       1       Lease       1970       4·25       40       40·0       N/A         C. S. Uptergrove       1       Lease       1970       4·25       310       177.0       N/A         F. Wood, III       1       Lease       1970       4·25       200       40·0       N/A         E. J. Terrill       1       Lease       1974       1       650       115·0       N/A         Summary       37       Lease       1970-1974       1-4.25       4,226       1,539·8       N/A         50       A. State       1,532       2,625·7       N/A		E. E. Peaster	7	Lease	1973	7	325	0.09	N/A	N/A
A. Speck       1       Lease       1970       4.25       40       40.0       N/A         C. S. Uptergrove       1       Lease       1970       4.25       310       177.0       N/A         F. Wood, III       1       Lease       1974       1       650       40.0       N/A         Summary       37       Lease       1970-1974       1-4.25       4,226       1,539.8       N/A         50       7,922       2,625.7       N/A		C. E. Sloan	-1	Lease	1973	2	63	10.0	N/A	N/A
C. S. Uptergrove 1 Lease 1970 4.25 310 177.0 N/A F. Wood, III 1 Lease 1970 4.25 200 40.0 N/A N/A Summary 37 Lease 1970-1974 1-4.25 4,226 1,539.8 N/A 50 150 150 150 N/A 100 150 150 N/A 100 150 150 N/A 100 N/A 10		A. Speck	-	Lease	1970	4.25	40	40.0	N/A	N/A
F. Wood, III 1 Lease 1970 4.25 200 40.0 N/A E. J. Terrill 1 Lease 1974 1 650 115.0 N/A Summary 37 Lease 1970-1974 1-4.25 4,226 1,539.8 N/A 50 7,922 2,625.7 N/A		C. S. Uptergrove	-1	Lease	1970	4.25	310	177.0	N/A	N/A
E. J. Terrill 1 Lease 1974 1 650 115.0 N/A Summary 37 Lease 1970-1974 1-4.25 4,226 1,539.8 N/A 50 7,922 2,625.7 N/A		F. Wood, III		Lease	1970	4.25	200	40.0	N/A	N/A
Summary 37 Lease 1970-1974 1-4.25 4,226 1,539.8 N/A 50 7,922 2,625.7 N/A		E. J. Terrill	-	Lease	1974	ч	650	115.0	N/A	N/A
50 7,922 2,625.7 N/A	Grazing	Summary	37	Lease	1970-1974	1-4.25	4,226	1,539.8	N/A	N/A
	Totals		20				7,922	2,625.7	N/A	N/A

<sup>a</sup>Tulsa District, Real Estate Division. 1974. Selected dump of outgrant master, Robert S. Kerr Lock and Dam. Tulsa, Oklahoma.

bNot available.

and grazing outgrants is returned to the counties (15). Table D.28.5 summarizes outgrants at the Robert S. Kerr project.

Although the surface area at the project was acquired in fee, the mineral rights were subordinated with the Corps' right to restrict exploration and drilling in certain areas (1). As a result, sand, gravel, and minerals can be removed from approximately 6,735 acres at the project (2). In particular the mineral rights on about 900 acres of coal along San Bois Creek were not acquired and shaft mining for coal at depths from 500 to 1,200 ft below the surface may result (2).

The Kerr project is located in a region once occupied by the "Mound Builders," a prehistoric culture characterized by huge burial mounds. Before project construction in 1958, the University of Oklahoma in cooperation with the NPS conducted a preliminary appraisal of the archeological resources of the project (1). The resident engineer reports tentative plans for incorporation of prehistoric displays at recreation areas (11).

Table D.28.5. Summary of Outgrants, Robert S. Kerr.

Investment to 1974 (\$)	.0 N/Aª	.0 107,039	.7 <u>N/A</u>	q
Acreage	20,800.0	28.0	2,625.7	dr 24, 22
Annual Rent (\$)	0	652	7,922	8 574
Number	1	7	[20	3
Purpose	Fish and Wildlife and Recreation Public Parks	Recreation Commercial	Agriculture and Grazing	0.14-10

ANot available.

<sup>b</sup>Total exceeds Manageable Resource Lands (Table D.28.1) because some land reported as outgranted for fish and wildlife purposes is currently also reported as outgranted for agricultural and grazing purposes.

#### 5. Resource Use Controls

Direct supervision of the Robert S. Kerr project is from the resident offices at the project. The resident engineer, a GS-13 supervisory civil engineer, has direct responsibilities for the McClellan-Kerr Arkansas River Navigation System and has a total staff of 163. The powerhouse and lock and dam offices are separate from the reservoir management, administration, and navigation maintenance offices at the project (17). The assistant resident engineer, a GS-12 supervisory civil engineer, manages the Navigation Maintenance Section which is responsible for navigation channel maintenance and field engineering of contracted work along the six pools of the navigation system (17,18). This section will be reduced when river channelization and contracted work are complete since field engineers will no longer be needed and the channel will require only periodic maintenance (11).

A GS-11 park manager supervises the Reservoir Management Section which is divided into two parts and is responsible for recreation and resource management at six projects on the OK portion of the Arkansas River. The portion of the section that includes supervision of the recreation pools of the Robert S. Kerr, W. D. Mayo, and the Ok portion of River Pool Number 13 is comprized of: 5 park managers (GS-5, GS-7, and GS-9 park rangers), 5 temporary park technicians (GS-4 park ranger trainees), and 14 permanent and 7 temporary workmen and laborers(17).

In the Operations Division at the district level the Reservoir Branch provides most of the supervision for field operations at the Kerr Reservoir project; the Office Operations Branch also assists with supervisory responsibilities (18). Although inspections of project outgrants are made by project park rangers, the Management and Disposal Branch, Real Estate Division is directly responsible for securing and

revoking outgrant agreements (18).

Plans for project resource development, including recreation and wildlife management areas were developed by the Planning and Program Development Branches of the Engineering Division. Within the Planning Branch, the Arkansas River Planning Section developed the lock and dam system on the Arkansas River in conjunction with the Little Rock District and the Environmental Resources Section planned land use allocations and recreational development and studied environmental impacts at the project. Refer to Figure D.28.2 for district staffing.

GS-13 GS-12 GS-12 GS-11 GS-9 GS-7 GS-4 GS-4 GS-14 GS-13 GS-12 GS-11 GS-9 GS-7 GS-7 GS-5 GS-5 GS-5 GS-3 GS-3 GS-13 Office Operations Branch (Temp) Supv Electrical Eng Supv Civil Eng
2 Civil Eng
1 Outdoor Rec Plnr
1 Civil Eng Tech
1 Gen Clerk
1 Civil Eng Clerk
1 Park Mgr
2 Prog Clerk
5 Park Tech (Temp) Operations Division Hydro-Power Branch Navigation Branch 1 Biologist 2 Civil Eng (IV) 3 Civil Eng l Eng Draftsman l Clerk-Typist Reservoir Branch 1 Park Mgr 1 Park Mgr 1 Clerk-Steno Supv Civil Eng Supv Civil Eng 1 Clerk-Steno 1 Clerk-Typist Supv Civil Eng GS-13 GS-13 GS-13 GS-13 GS-12 GS-11 GS-9 GS-4 GS-4 GS-3 GS-13 Management and Disposal Branch Planning and Control Branch Realty Management Section Supv Realty Spec

1 Realty Spec (V)
5 Realty Spec
1 Realty Clerk (Typing)
1 Realty Clerk (Steno)
2 Clerk-Steno Real Estate Division Acquisiton Branch Supv Realty Spec Supv Realty Spec Appraisal Branch Supv Realty Spec Supv Appraiser Realty Officer Robert S. Kerr Area Field Office Figure D.28.2. Recreation-Resource Management Interrelationships - Tulsa Engineer District DISTRICT ENGINEER GS-12 GS-12 GS-11 GS-14 GS-13 GS-12 GS-11 GS-9 GS-7 GS-7 GS-6 GS-4 GS-4 GS-4 GS-4 GS-11 Environmental Resources Section 2 Landscape Arch
2 Civil Eng
2 Biologist
Civil Eng Tech
1 Civil Eng
1 Carto Tech
1 Carto Tech
1 Biologist (Temp)
2 Biologist (Temp)
3 Livil Eng
1 Carto Tech
4 Late Carto Tech
5 Late Carto Tech
6 Late Carto Tech
7 Late Carto Tech
8 Late Carto Tech
9 Late Carto Tech
1 Carto Tech Supv Outdoor Rec Plnr 1 Supv Outdoor Rec Plnr Biologist Supv Civil Eng Archeologist Planning Branch Supv Civil Eng GS-15 Engineering Division Supv Civil Eng GS-13 GS-11 GS-11 GS-7 GS-4 GS-3 GS-13 Arkansas River Planning Section Program Development Branch 5 Civil Eng 2 Civil Eng 1 Civil Eng Tech 1 Eng Draftsman 1 Clerk-Steno Supv Civil Eng Supv Civil Eng D.28.22

## III. KEY FINDINGS

# A. Recreation

- 1. Although recreation is not an authorized project purpose, the Corps has developed 11 public use areas on 4,252 acres. The Corps operates and maintains 10 of these areas, and the USF&WS operates and maintains one area within the boundary of the Sequoyah NWR. The Town of Webbers Falls has a permit for construction of a boat ramp on an 8-acre parcel of Corps land adjacent to the town. There is a 28-acre commercial concession incooperated as part of the recreation area at Applegate Cove.
- 2. The 11 public use areas are generally adequate for short-run visitor pressures but some small recreation areas are occasionally overcrowded. Visitation for 1973 was 680,700 compared to the planning estimate for 1973 of one million.
- 3. The facilities and grounds managed by the Corps were in excellent condition, however the public use area developed by the Corps and managed by the USF&WS was in poor condition.
- 4. Access to the project area is good from major highway networks around the region, but most direct access to public use areas is from unpaved secondary county roads. The roads within the public use areas are paved and well maintained.

## B. Fish and Wildlife

- 1. The Robert S. Kerr Reservoir has replaced a muddy stream fishery of mostly nongame species with a less turbid reservoir fishery that supports diverse game fish species. No commercial fishing is allowed on the reservoir but sport fishing is excellent.
- 2. Management of fish and wildlife resources is primarily the responsibility of the ODWC and the UFS&WS. There are 20,800 acres of

land and water licensed to the USF&WS for the Sequoyah NWR. The ODWC is expected to manage 1,609 acres of land for wildlife when funds become available. Until then, the land is interimly outgranted for agriculture and grazing.

3. Good cooperation between the ODWC, the USF&WS, and the Corps has occurred concerning pool regulation during the waterfowl nesting and fishing spawning seasons.

# C. Corps and Contiguous Land Use

- 1. The land acquired at the Robert S. Kerr project will not be sufficient to maintain aesthetic quality around the complete boundary. The major land acquisition was for wildlife management and recreation areas. Only a narrow border of project land around the reservoir was acquired between these major areas.
- 2. The master plan delineates four areas comprising 69 acres for quasi-public organizations, although these lands are not currently outgranted. No project lands were designated for nonprofit membership agencies or private recreation groups.
- Plans for forest, range, and wildlife management are being prepared by the Corps to guide land and water management of Corps property.
- 4. Two commercial ports within the project boundary benefit from increased river transport provided by the project.
- 5. Land contiguous to the project is private agricultural land which provided good potential for real estate speculation. Because the project is relatively new the development of subdivisions, including mobile home parks, is minimal.

# D. Real Estate Programs and Practices

- Rigid investigation of bidders for contracted maintenance on Corps property has resulted in excellent compliance with contract specifications.
- By limiting access across Corps property to the lake, the Corps reduces incentive for private recreation development around the project boundary.

# E. Corps Organization

- 1. At the project, there are no Corps personnel with the biological expertise to allocate range carrying capacity for domestic animals and wildlife, to contribute to the management plans and programs of the ODWC, and to coordinate Corps responsibility for fish and wildlife enhancement on project lands.
- 2. Planning for recreation and wildlife enhancement is accomplished by personnel in the Environmental Resources Section, Planning Branch, Engineering Division. This section is staffed with three biologists (GS-9 and GS-12) two outdoor recreation planners, two landscape architects, five civil engineers, one archeologist, and seven supportive personnel. The section chief is a GS-13, outdoor recreation planner.
- 3. The Reservoir Branch, Operations Division is primarily responsible for management of recreation and wildlife resources. The staff is composed mostly of civil engineers but contains two park managers and one biologist.
- 4. Corps outgrants are managed in the Management and Disposal Branch, Real Estate Division. Although inspections and field decisions are made by park rangers at the project, lease cancellations are made by the district.
  - 5. The resident engineer (GS-13) stationed at the Robert S. Kerr

Resident Office has responsibility for reservoir management at six projects, navigation at five projects, and power production at two projects along the McClellan-Kerr Arkansas River Navigation System.

The total program involves navigation from Fort Smith, AR to Tulsa, OK and employs 163 people.

- 6. The assistant resident engineer (GS-12) supervises navigation channelization and contracted work along the system. Separate staffs are located at each lock and dam and powerhouse. A GS-11 park manager supervises the Reservoir Management Section of the system.
- 7. The staff at Robert S. Kerr Lock and Dam and Reservoir includes lock, powerhouse, marine fleet, engineering, and reservoir management personnel. There are permanent and temporary recreation and resource management personnel assigned duties at the Robert S. Kerr project, the W. D. Mayo project, and the OK portion of River Pool Number 13.
- 8. Inspection and patrol of Corps recreation areas and real estate outgrants are accomplished by the five permanent park rangers and five temporary park ranger trainees. Identified by the district as park managers and park technicians, the park rangers have grades of GS-5 to GS-9 and the trainees are GS-4.
- 9. The Park Ranger Trainee Program is successfully placing qualified personnel as recreation resource manager in the district.

# F. Environmental Problems

- 1. Turbid water and shoreline erosion (caused by wind and wave action in the relatively shallow pool and along the extensive shoreline) are degrading the reservoir's aesthetic quality.
- 2. Large amounts of sediment from the Arkansas River and its tributaries are deposited in the riverbed of the pool, necessitating maintenance dredging which disrupts fish and wildlife and requires project acreage for dredged material disposal.

#### IV. REFERENCES

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- 18. Personal communication, 22 October 1974. Tulsa District, Operations Division, Tulsa, Oklahoma.

# 29. DENISON DAM - LAKE TEXOMA Southwestern Division Tulsa District Oklahoma and Texas

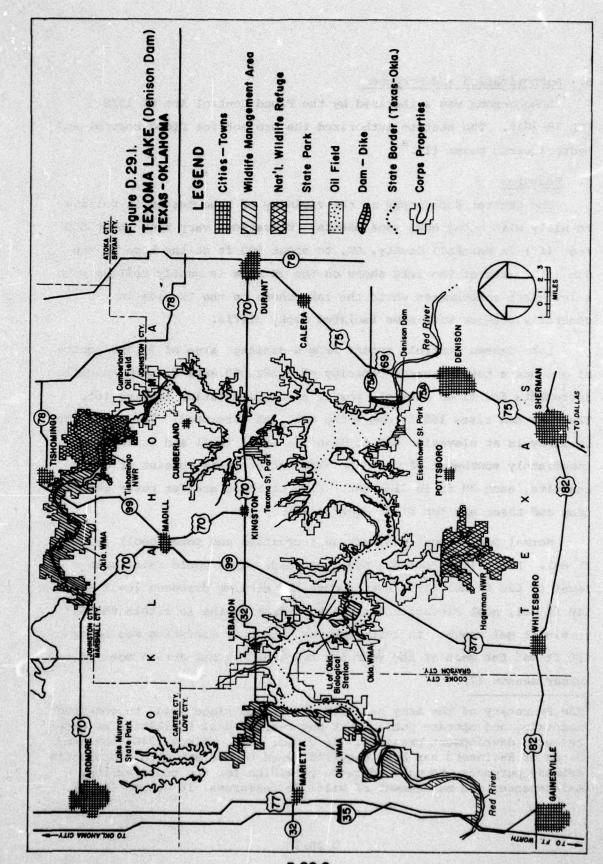
#### I. SETTING

## A. Location

Denison Dam - Lake Texoma is located on the Red River in Bryan, Johnston, Marshall, and Love Counties, Oklahoma, and Grayson and Cooke Counties, Texas, about 726 miles (mi) upstream from the mouth of the river. The dam is about 15 mi southwest of Durant, OK and about 5 mi northwest of Denison, TX (1). There are two major arms of the lake - the Washita arm which extends 45 mi northward from the dam and the Red River arm which extends 60 mi westward from the dam.

Even though the immediate area is considered rural (2) transportational routes have opened the area by lowering driving time from major urban areas. Until the early to mid-sixties, access to Lake Texoma was primarily by state routes (primary and rural) and a few federal highways. Access to the western portion of the lake has been enhanced by the completion of I 85, a north-south route connecting Oklahoma City and the Dallas/Ft. Worth area. Recent upgrading of I 75/69, and a four-lane divided section between Sherman, TX, and Durant, OK, has enhanced access to the eastern portion of the lake. This route provides access from the Tulsa, OK area and the Dallas/Sherman, TX area. Direct lake access is provided by numerous hard and dirt surfaced roads which criss-cross in east-west and north-south directions (3). The general location of the lake is shown in Figure D.29.1.

The area has a rich history with numerous sites associated with the Choctaw Indians, French, and Spanish expeditions, and coach and trade routes of the early west (4).



D. 29.2.

# B. Authorization and Purposes

Lake Texoma was authorized by the Flood Control Act of 1938 (PL 75-761). The statute authorized the project for flood control and hydroelectric power (1).

## C. Features

The general topography in the vicinity of Lake Texoma is rolling to hilly with occasional escarpments. Elevations vary from about 850 feet (ft) in Marshall County, OK, to about 500 ft at the base of the dam (1). Most of the lake shore on the OK side is gently rolling with a few steep embankments while the lake shore on the TX side is generally steeper with some isolated rocky cliffs.

Lake Texoma controls runoff from a drainage area of 33,783 square mi and has a total storage capacity of 5,382,000 acre-ft with specific increments for flood control, power, and sedimentation reserve (5). The main dam rises 165 ft above the original streambed. The emergency spillway is at elevation 640 ft mean sea level (msl) and is located immediately southwest of the dam. The outlet works consist of eight conduits, each 20 ft in diameter. Five of these are for power generation and three are for flood control (6).

Normal pool elevation (average recreation and power pool) is 617 ft msl. Recently, proposals have been made which would raise this level to 620 ft msl (1). Even though the minimum drawdown level is 540 ft msl, pool elevation during the summer months is within the 617 to 618 ft msl range. In 1956, however, the pool elevation was below 610 ft msl for most of the year and below 600 ft msl during most of the summer season (7).

The Secretary of the Army has been authorized since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

General resource information is provided in Table D.29.1.

Table D.29.1. Resource Statistics, Lake Texoma (Denison Dam).

Date of Authorization		1938 <sup>a</sup>
Rights in Land Acquired Between		1938-1943 <sup>b</sup>
Date of Impoundment		July, 1942 <sup>C</sup>
Date of Full Operation		July, 1944 <sup>C</sup>
Lake Size When Water Level is at:		
Spillway elevation (640 ft m	sl)	140,000 acres <sup>a</sup>
Normal Pool Elevation (617 f	t msl)	89,000 acresd
Normal Minimum Pool Elevation	n (540 ft msl)	N/A <sup>e</sup>
Minimum Design Elevation		N/A
Water Fluctuation - Summer Recrea	tion Season	5 feet <sup>a</sup>
Shoreline at Normal Pool		580 miles <sup>C</sup>
Held in Fee Simple by Corps		580 miles <sup>C</sup>
Land Area Managed by Corps		
Total Land in Project		194,350 acres <sup>d</sup> (194,392) <sup>c</sup>
Fee Title in U. S.	193,859 acres <sup>d</sup> (193,904) <sup>c</sup>	
Easements	491 acres <sup>d</sup> (488) <sup>c</sup>	
Project Operation Lands		2,700 acres <sup>d</sup> (15) <sup>c</sup>
Manageable Resource Lands		77,859 acres f

Tulsa District. 1973. Survey report on Denison Dam (Lake Texoma) restudy. Vol. 4, Appendix IV. Tulsa, Oklahoma.

bar Tulsa District. 1971. Plates for the master plan, Denison Dam. Tulsa, Oklahoma.

<sup>&</sup>lt;sup>C</sup>RRMS. 1973.

d Tulsa District. 1973. Master plan, appendix A: project resource management plan, Lake Texoma. Tulsa, Oklahoma.

e Not available.

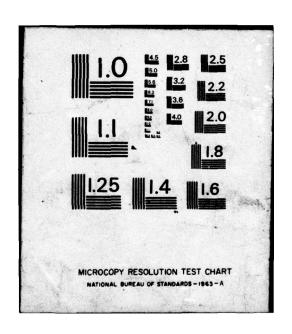
fotal Project Land (194,350 acres) minus Land Flooded at Normal Pool (89,000 acres) minus Land in Easement (491 acres) minus Project Operations Land (2,700 acres).

COASTAL ZONE RESOURCES CORP WILMINGTON N C

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEM--ETC(U)

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# II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

# A. Analytical Unit

Although the impact of the authorized purposes of Lake Texoma affect a considerable area (power for the southwest and flood control for a four-state area), the utilization of the lake for recreation is most significant (2). The fact that attendance has increased from 500,000 in 1946 to 10,299,800 in 1971 accentuates this significance.

The market-use area for Lake Texoma is more extensive than for most other reservoirs in the area. This is due to the early date of impoundment and its early popularity. The proximity of the Oklahoma City metropolitan area (approximately 100 mi north) and the Dallas/ Fort Worth metropolitan area (approximately 65 mi south) affords Lake Texoma a large number of potential visitors. Within a 100 to 150 mi radius there was a 1970 population of 1,795,287 persons (7). During 1969, 36% of the visitors to Lake Texoma traveled over 100 mi while an equal amount traveled from 0 to 25 mi (1). The tremendous improvement in highways since 1960 in the two states has significantly decreased travel time and resulted in a wider area of recreational influence.

The impact area can be considered in terms of the seven counties contiguous to Lake Texoma (2). From 1940 to 1950 this area experienced a 15.8% decline in population, but during the 1960 to 1970 period the population increased 6.5%. The recent increase is due in a large part to the increased population of Grayson County, TX, where the Sherman/Denison area is experiencing significant economic growth. Accompanying this recent growth is a significant increase in the value of real estate in the surrounding seven-county area. In 1950, total real estate value in these counties was \$120,524,000; by 1970 this had

jumped to \$290,636,000. Even higher increases were noted in total bank deposits which increased from \$78,600,000 in 1950 to \$298,445,000 by 1970 (2).

Any number of induced economic benefits have been attributed to Lake Texoma and its annual 9 million plus visitors. The University of Oklahoma has attributed the following effects in the seven-county area solely to the existence of the lake: the population has increased by 9,915; total personal income has increased \$129 million; the labor force has increased by 1,848 and there have been 1,768 new jobs created; bank deposits are \$21.4 million more than there would be without the lake; and retail sales in area stores have increased \$204 million (2).

The total number of subdivisions of secondary and primary homes would probably not have existed were it not for the lake. Immediately around the lake there are over 70 subdivisions of various sizes. Aerial photographs of district recreation sites taken in 1967 indicate that over half of these subdivisions are located around established Corps recreation sites (8). A majority of the subdivisions, approximately 40, are located on the south shore in TX within approximately 15 mi of the Denison/Sherman metropolitan area. On-site personnel indicated that a 100 ft by 100 ft lot can cost up to \$10,000 depending on closeness to the shore (3).

A direct impact of the lake is the presence of 23 concessioners around the lake, the largest of which are located on the south shore (9). Most of the concessioners have marinas with public and private slips and associated sales and services. There are estimates that boat owners add, in boat stall rentals alone, about \$50,000 each month to the local economy (7).

In addition to the above impacts which are more closely associated with recreation, the two primary project purposes, flood control and power, have contributed significantly to the area. It has been estimated that the savings due to flood prevention have approached \$30 million. Additionally, the project has provided area residents with nearly \$18 million worth of electricity (2).

# B. Ownership

# 1. Corps

The project consists of 193,859 acres of fee land and 491 acres of flowage easement (5). Most all land was acquired prior to 1 January 1943 (11). RRMS 1973 data indicate that about 30% of the boundary has been marked.

In general, the take line is a blocked perimeter that encompasses the 640 ft msl mark. For the most part, mineral rights were not acquired; however, in the 1950's numerous claims were filed by the owners of rights which resulted in a court-established time limitation for the filing of claims. This limitation has ended, and all mineral rights not so claimed are subject to project operation (5).

As can be noted from Table D.29.2, numerous discrepancies occur within the acreages of various land use classifications. From two sources, both 1973, the total land area above conservation pool (617 ft msl) varies over 230 acres. Summing the acreages of the major land use categories from different sources gives differing totals. This may be the result of the inclusion of water acreage in some categories (i.e., fish and wildlife) or from collateral land uses (i.e., wildlife and recreation).

A significant portion (over 128,000 acres) of the project land is outgranted for various purposes (Table D.29.3).

Table D. 29.2. Comparison of Acreage and Land Use at Lake Texoma (Denison Dam) from Several Recent Sources.

Land Use	Acres	Acres	Acres	Acres
Total land above conservation pool	105,095	104,859	1	1
Operation and maintenance		2,700	15	-
Public recreation (total)		4,365	12,988	
State and local leased		2,165	2,023	2,594
Corps recreation area		2,200	10,965	
Wildlife management (total)		-	68,744	1
Federal and State licensed		29,130	60,711	54,009
Agriculture and grazing (total)				55,427
Agricultural lease	14,294	1	-	13,357
Grazing lease		!	-	42,070
Cottage and club sites (total)		348	1	276
Cottage sites (leased)		27	-	52
Club sites (leased)		311	-	251
Quasi-Public sites	6,406	2,317	-	2,317

Arulsa District. 1973. Survey report on Denison Dam (Lake Texoma) restudy. Tulsa, Oklahoma.

brulsa District. 1973. Master Plan, appendix A: project resource management plan. Tulsa, Oklahoma

CRRMS. 1973.

drulsa District, Real Estate Division. 1974. Computer dump of outgrant conditions. Tulsa, Oklahoma.

Table D. 29.3. Summary of Outgrants, Lake Texoma (Denison Dam).

Pish & Wildlife   6	Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Recreation         1         0         2,594.2           Public Parks         7         587         2,316.6           Recreation         24         35,650         1,296.6           Recreation         38         4,400         275.8           Recreation         38         44,066         13,356.4           Private         26         44,066         13,356.4           Agriculture         26         44,066         101,457         42,070.1           Right of Way         242         17,713         1,091.4           Other         57         9,336         11,103.8           Totals         601         213,209         128,113.9	Fish & Wildlife	9	0	54,009.0	N/Aª
Recreation       587       2,316.6         Quasi-Public       22       35,650       1,296.6         Recreation       38       4,400       275.8         Private       38       44,066       13,356.4         Agriculture       26       44,066       13,356.4         Grazing       179       101,457       42,070.1         Right of Way       242       17,713       1,091.4         Other       57       9,336       11,103.8         Totals       601       213,209       128,113.9	Recreation Public Parks	282 F	0	2,594.2	N/A
Recreation       24       35,650       1,296.6         Recreation       38       4,400       275.8         Private       26       44,066       13,356.4         Agriculture       26       101,457       42,070.1         Grazing       179       17,713       1,091.4         Right of Way       242       17,713       1,091.4         Other       57       9,336       11,103.8         Totals       601       213,209       128,113.9	Recreation Quasi-Public	52	283	2,316.6	N/A
Recreation       38       4,400       275.8         Private       26       44,066       13,356.4         Agriculture       26       44,066       13,356.4         Grazing       179       42,070.1         Right of Way       242       17,713       1,091.4         Other       57       9,336       11,103.8         Totals       601       213,209       128,113.9	Recreation Commercial	24	35,650	1,296.6	2,729,764
Agriculture         26         44,066         13,356.4           Grazing         179         101,457         42,070.1           Right of Way         242         17,713         1,091.4           Other         57         9,336         11,103.8           Totals         601         213,209         128,113.9	Recreation Private	38	4,400	275.8	N/A
Grazing         179         101,457         42,070.1           Right of Way         242         17,713         1,091.4           Other         57         9,336         11,103.8           Totals         601         213,209         128,113.9	Agriculture	26	44,066	13,356.4	N/A
Right of Way         242         17,713         1,091.4           Other         57         9,336         11,103.8           Totals         601         213,209         128,113.9	Grazing	179	101,457	42,070.1	N/A
Other         57         9,336         11,103.8           Totals         601         213,209         128,113.9		242	17,713	1,091.4	N/A
601 213,209 128,113.9		57	9,336	11,103.8	N/A
	Totals	601	213,209	128,113.9	2,729,764

aNot available.

The Corps has designated within the project area four homesite areas (cottage sites). The homesite areas in TX are Elm Ridge (26 cottage sites) and Mill Creek (151 sites); the areas in OK are Caney Creek (133 sites) and Sand Point (157 sites) (10, 11, 12, 13, 14). Of the 447 sites, approximately 318 were indicated by the Corps as being disposed and 22 are indicated as being leased. Of the remaining 111 cottage sites, 15 are slated for sale with a total appraised market value of \$20,035 (15).

Under Executive Order 11508, about 30 additional tracts of land amounting to 10,000 acres are being considered for disposal by the General services Administration (1). Real Estate Division final ownership maps (10) indicate that 864.4 acres of land have already been disposed. Conversely, the 1973 Project Resource Management Plan states that all acquired project land is necessary for project operations, public use, and wildlife management.

#### 2. Other Federal Agencies

No other federal agencies own land of any significance within the project or in the immediate vicinity of the lake.

#### 3. State Government

The State of OK owns two tracts of land adjacent to outgranted Corps-owned land. The Oklahoma Tourism and Recreation Department (OTRD), formerly the Oklahoma Department of Planning and Resources, purchased approximately 200 acres of land adjacent to land they leased from the Corps for Lake Texoma State Park (1). The Oklahoma Department of Wildlife Conservation (ODWC) has purchased 4,682 acres of land adjacent to land licensed from the Corps at the Hickory Creek Management Unit (16).

OK issued revenue bonds in 1954 for construction of lodges and cabins at several state parks. Lake Texoma State Park was included,

but it was the only state park which was under lease arrangements with the Corps (17). Discussion with personnel who were with the Oklahoma State Parks Division (OSPD) at that time indicated that the state purchased for a nominal fee land from the Corps on which the lodge and cabins were constructed. This purchase transpired because it was not legal for the state to expend revenue bond monies for construction on lands not owned by the state (18). District personnel indicated the state does not own lands within the area leased to the state for Texoma State Park (19).

## 4. County, Municipal, Special District

No county, municipality, or special district owns land within the project area. A few small towns, such as Tishomingo and Lebanon, OK, have annexed land immediately adjacent to the Corps boundary.

#### 5. Private

Most lands contiguous to the project are in private ownership, but there are some instances of private land holdings within the project boundary. These tracts are islands of land surrounded by Corps-owned land. Other areas of private ownership within the project boundary are embodied in numerous cottage sites located in four different areas.

The most significant private tract is on Preston Point in TX, approximately 5 mi west of the dam. According to district maps, at least six subdivisions are located in this area of approximately 450 acres (8). A majority of the over 70 subdivisions located around the lake (all adjacent to the Corps project boundary) are in Grayson County, TX within 15 mi of the damsite.

Of the 447 Corps cottage sites, approximately 70% (316) are indicated as being disposed. The district retained the flowage easement, where it existed, but sold the land it acquired in fee simple. The

sites range in size from less than an acre to over 3 acres. Approximately 84% of the cottage sites available on the TX side have been sold whereas approximately 61% of those on the OK side have been disposed.

## C. Resource Management

#### 1. Recreation

The district administered public-use activities after impoundment was completed in 1944; however, in 1946, a cooperative agreement between the National Park Service (NPS), Department of the Interior and the Chief of Engineers transferred recreational responsibility to the NPS. This agreement was cancelled in 1949 and the district reassumed control control of recreational activities (1).

There are a total of 51 public recreation sites around the 580 shoreline miles of Lake Texoma. Included in the total are Texoma State Park in OK, Eisenhower State Park in TX, and two sites which are leased for municipal parks, one in TX and one in OK. The remaining 47 sites are managed by the Corps, although two are indicated as being undeveloped.

Most of the Corps recreation sites are well developed, having boat ramps, water systems, swimming beaches, picnic tables and shelters, grills, fireplaces, trash receptacles, and toilet facilities. Trailer dump stations are available in areas catering to trailers. Site maintenance was good and the district has a contract with one company for refuse collection, sanitary facility maintenance, and mowing (3). Service has been very good and the condition of the Corps public recreation sites reflected conscientious work.

At several sites retail stores and trailer parks have been established adjacent to Corps recreation sites. Most of this development was in a declining state of repair. In association with many of the public recreation areas are commercial recreation sites (Table D.29.4). Concessions at Lake Texoma appear to be profitable. Eleven of the 23 existing concessioners have been operating since 1951. The concessions visited were very well kept and large investments in docking and related facilities have been made. The district is now computing rent according to the graduated rental system. Leases executed more recently (1970 and 1971) are generally for a 10-year period. The effects of the shorter-termed leases on the concessioner and his investment-return factors, particularly with 1 or 2 years of decreased visitation, are not known. Concessions on the TX side are probably more profitable than those on the OK side. From 1971 to 1973 visitation at the TX concession sites increased 226,800 while visitation at OK sites increased only 18,700.

None of the Corps-maintained recreation sites on the 3ide have swimming beaches due to topography and sloughing problems. Most are developed for boating and fishing with 14 of the 17 acres (excluding the Damsite and Overlook) having concessioners while 12 of the 14 have marinas. Visitation at the TX sites has increased approximately 680,000 between 1971 and 1973 and all sites except the Overlook and Pleasure Bay sites have additional facilities planned. Swimming beaches and change houses are planned for 13 of the sites and several additions include more camping and picnicking facilities (no class A campgrounds planned), trailer dump stations, a few boat sanitary dump stations, playground equipment, and additional roads (5).

Of the 27 Corps recreation sites on the OK side, there are 11 concessioners, 9 of which have marinas (5). Real Estate Division data, presented in Table D.29.4, indicate that there are 10 concessioners operating in OK. Available facilities are similar to those on the TX side, although at least two sites have buoyed swimming beaches. Visitation at the OK sites increased by 27,400 between 1971 and 1973. Of

Table D.29.4. Outgrants for Recreation -- Commercial, Lake Texoma (Denison Dam).a

				Rental				Inves	Investment	
Location	Grantee	Instrument	Date	Term (Yrs)	Basis	Annual Rent Paid (\$)	Acreage	to 1974 (\$)	Planned (\$)	Turn- overs
Alberta Cr. (Marshall, OK	Reid, Z. M.	Lease	1970	2	Fixed + gradu- ated	656.55	25.0	81,775	N/A	•
Arrowhead (Marshall, OK)	D. G. Enterprises	Loase	1971	2	Fixed	360.00	2.6	97,237	N/A	-
Big Mineral (Grayson, TX)	Meark, H. & B.	Lease	1949	25	Fixed +	17.699	0.68	73,107	N/A	e
Bridge View (Marshall, OK)	Whitaker, D. W.	Lease	1970	9	Fixed + gradu- ated	1,247.52	21.4	81,957	N/A	<b>.</b>
Cedar Bayou (Grayson, TX)	Victa Corp.	Lease	1950	52	Fixed +	495.19	79.0	132,336	N/A	ı
Cedar Point (Grayson, TX)	Drannon, T. E.	Lease	1970	я	Fixed + gradu-	1,886.56	40.0	110,567	N/A	0
Cumberland Cove (Marshall, OK)	Rigsby, C. E. et al.	Lease	1761	9	Fixed + gradu- ated	450.00	70.5	129,455	N/A	•
Damsite (Grayson, TX)	Oglee, W. et al.	Lease	1960	22	Fixed + 2.32%	1,274.58	0.1	38,527	N/A	٦
Flowing Wells (Grayson, TX)	Thomas, J. D.	Lease	1761	ŧ.	Fixed	190.00	10.5	20,891	N/A	0
Grandpappy Point (Grayson, TX)	Parsons, D. W.	Lease	1950	35	Fixed +	2,780.28	144.0	245,095	N/A	-
Hickory Creek (Love, OK)	Jeong, P.	Lease	1921	8	Fixed +	824.35	31.0	56,873	N/A	7
Highport (Grayson, TX)	Loe, C. D. Jr.	Lease	1950	8	Fixed +	14,721.47	256.7	357,955	N/A	•
Little Glasses (Marshall, OK)	Anderson, L. V	L. W. Lease	1972	90	Fixed + gradu- ated	1,170.92	73.0	105,100	N/A	•

Table D.29.4 (continued)

				Rental				Inves	Investment	
Location	Grantee	Instrument	Date	Term (yrs)	Basis	Annual Rent Paid (\$)	Acreage	to 1974 (\$)	Planned (\$)	Turn- overs
Mill Creek (Grayson, TX)	Kupiec, C. S.	Lease	1950	25	Fixed +	3,001.22	49.0	148,969	N/A	2
Newberry Creek (Bryan, OK)	McCoy, J. F.	Lease	1970	9	Fixed	615.00	31.0	55,302	N/A	0
Paradise Cove (Grayson, TX)	Chambers, W. V.	Lease	1960	20	Fixed +	247.00	19.5	12,500	N/A	æ
Pleasure Bay (Grayson, TX)	Pleasure Bay, Inc.	Lease	1951	25	Fixed +	139.93	9.0	26,509	N/A	S
Preston Bend (Grayson, TX)	Stagner, B.	Lease	1970	10	Fixed + gradu- ated	900.00	32.3	147,401	A/N	•
Preston Fish Camp (Grayson, TX)	Metzler, C. J.	Lease	1970	20	Fixed + gradu- ated	00.009	21.0	79,545	A, N	
Rock Cove Camp (Bryan, OK)	Hyands, F. P. Jr.	Lease	1950	25	Fixed +	217.23	20.0	29,263	N/A	•
Rock Creek Camp (Grayson, TX)	Florence, L. E.	Lease	1950	52	Fixed +	694.78	134.0	70,275	N/A	<b>T</b>
Soldier Creek (Marshall, OK)	Mooney & Guild	Lease	1950	25	Fixed +	1,358.19	93.7	283,831	N/A	g
Walnut Creek (Grayson, TX)	Dempsey, C. F.	Lease	1950.	25	Fixed +	649.04	21.4	79,252	N/A	m
Willow Springs (Bryan, OK)	Willow Springs Res.	Lease	1950	25	Fixed +	500.00	31.3	266,042	N/A	•
Texas	14 Outgrants					28,249.76	1.768	1,542,929	N/A	
Oklahoma subtotals	10 Outgrants					7,399.76	399.5	1,186,835	N/A	
Total-Commercial Recreation	1 24 Outgrants					35,649.52	1,296.6	2,729,764	N/A	

Personal communication, 15 November 1974. Tulsa District, Real Estate Division, Tulsa, Oklahoma.

b Not available.

the existing Ok public recreation sites, three have no planned facility additions due to siltation in the upper areas of the Washita and Red River Arms of the lake. The remaining areas have planned additions even though development at two areas is conditional due to siltation in the Washita Arm (5). Planned additions for OK sites are basically the same as those for TX sites, although three sites will be upgraded to class A camping (5).

Three are no new public recreation sites planned by the Corps and two of the sites initially planned in 1960, Preston Point (OK) and Washita Point (TX), have not been developed (20). A 1967 design memorandum indicated development of these sites would require cost-sharing under PL 89-72 and that the estimated costs of developing these sites ranked second and fourth among the other 43 sites (21).

The 1973 Project Resource Management Plan indicated there were two areas in which a \$1 per day user fee was assessed - Burns Run (east) and Preston Bend. The 1967 design memorandum designated 12 sites as fee areas, while RRMS 1973 data indicate fees were collected at 28 sites. Total fees collected in 1973 were \$10,537 and cost of collection was \$7,142 (22).

Data comparisons of percentage activity use for 1966 (1) and 1973 (22) indicate a change in visitor use of Lake Texoma. The percentage of those fishing decreased from 60 to 58%, swimming decreased from 29 to 10%, and camping decreased from 12 to 9%. Conversely, boating increased from 5 to 11%, sightseeing increased from 13 to 27%, and picnicking increased slightly from 5 to 6%. A comparison of 1971 and 1973 visitation tends to support the reported visitor changes though some discrepancies exist, presumably due to differential site preferences. In terms of boating, Little Glasses and Highport Resorts (large marinas) showed significant increases in visitation, while

Grandpappy Resort (also a large marina) showed a decrease in visitation. The largest camping area, Burns Run, showed a slight decrease in visitation while other camping areas, such as Preston Fishing Camp, Roads End, and Buncombe Creek showed slight increases. It is interesting to note that the TX public recreation sites are developed more for boating while the OK sites are developed more for camping.

RRMS 1973 data indicate the presence of the following private recreation facilities at Lake Texoma: 505 individual docks, 6 community-private docks, 44 other floating facilities, and 730 non-transit trailers.

In addition to the Corps' operation of 47 public recreation sites around Lake Texoma, there are leases for 22 quasi-public recreation sites, 16 private recreation sites, and 22 leased cottage sites (9).

The 22 quasi-public recreation areas, developed as group camping areas, include 2,316.6 acres; however, the 1973 Project Resources
Management Plan indicates 19 quasi-public sites totalling 2,417.5 acres.
Tabular summaries for the quasi-public sites are included in Table D.
29.5. Those quasi-public sites observed were fenced and locked. The leases are for a nominal rental fee of \$1, except for two VFW Gate City Post sites for \$400 and \$175 (9). The VFW sites are not included in the 1973 Project Resource Management Plans' discussion of quasi-public sites. The terms of the leases are generally for 25 years and most will expire between 1976 and 1984 (9).

The original master plan designated sites for which long-term leases were to be granted to individuals and clubs (5). As shown in Table D.29.6, there are 16 leases for private club recreation with a cumulative acreage of 250.7 (9). Several of these sites have private marinas with associated facilities. The largest private boat club (32 acres) is adjacent to the Caney Creek Homesite Area in OK. Lease terms are generally 20 years and most leases will terminate between 1975 and

Table D.29.5. Ougrants for Recreation -- Quasi-Public, Lake Texoma (Denison Dam). a

				Rental				Investment	tment
Location	Grantee	Instrument	Date	Term (yrs)	Basis	Current Annual Rent (\$)	Acreage	to 1974 (\$)	Planned (\$)
Grayson, TX	Dept. of Air Force	Lease	1948	Indef.	1	o	100.0	N/A <sup>b</sup>	N/A
Grayson, TX	Dept. of Air Force	Lease	1956	Indef.	1	0	350.0	N/A	N/A
Grayson, TX	Area V TX Assoc.	Lease	1965	15	1	<b>o</b>	127.0	N/A	N/A
Grayson, TX	Austin College	Lease	1970	10	Fixed		28.7	N/A	N/A
Grayson, TX	Boles Orphan Home	Lease	1966	15	Fixed	1	56.0	N/A	N/A
Grayson, TX	Boy Scouts of Am.	Lease	1952	25	Fixed		250.0	N/A	N/A
Grayson, TX	Cross Timbers	Lease	1967	52	Fixed		150.0	N/A	N/A
Grayson, TX	Dallas Boys Home	Lease	1966	25	-	Ó	126.0	N/A	N/A
Grayson, TX	Episcopal Rec. Ctr.	Lease	1957	25	Fixed	#	50.0	N/A	N/A
Grayson, TX	Girl Scouts, Dallas	Lease	1951	25	Fixed	<b>-</b>	49.7	N/A	N/A
Marshall, OK	Methodist Ch. OK	Lease	1958	25	Fixed	i i	162.0	N/A	N/A
Grayson, TX	Methodist Ch. TX	Lease	1954	22	Fixed		65.0	N/A	N/A
Marshall, OK	Oklahoma Univ.	Lease	1954	25	1	• (1) no	307.6	N/A	N/A
Marshall OK	Okla. City Diocese	Lease	1959	25		0	95.0	N/A	N/A

Table D. 29.5 (Continued)

				Rental				Investment	nent
Location	Grantee	Instrument	Date	Term (yrs)	Basis	Current Annual Rent (\$)	Acreage	to 1974 (\$)	Planned (\$)
Grayson, TX	Presby. of Trinity	Lease	1951	25	Fixed		38.0	N/A	N/A
Bryan, OK	Presbyterian Ch.	Lease	1951	23	Fixed	-	50.0	N/A	N/A
Grayson, TX	Sherman Cp.fire Girls	Lease	1954	25	1	•	75.0	N/A	N/A
Grayson, TX	Straight Arrow Club	Lease	1962	25	Fixed	-	58.5	N/A	N/A
Grayson, TX	Tex. Baptist Bible	Lease	. 1954	25	l	0	56.0	N/A	N/A
Grayson, TX	TX St. College Women	Lease	1953	25	Fixed	-	118.0	N/A	N/A
Grayson, TX	VFW Gate City Post	Lease	1961	20	Fixed	400	33.1	N/A	N/A
Grayson, TX Texas subtotal	VFW Gate City Post 18 Outgrants	Lease	1959	50	Fixed	175 585	1,702.0	N/A	N/A
Oklahoma subtotal Total quasi-public	4 Outgrants 22 Outgrants					587	614.6		

a Tules District, Real Estate Division. 1974. Computer dump of outgrant conditions. Tulsa, Oklahoma.

b Not available.

Table D.29.6 Outgrants for Recreation -- Private, Lake Texoma (Denison Dam).a

	Grantee	Instrument	Date	Tal	Annual Bent Daid (S)	Acrosgo	to 1974 bl	Dlanne
				(yrs)	(A) pres serior terror	afrator	(\$)	(\$)
Club. Sites								
Grayson, TX	Am. Legion Post 164	Lease	1960	50	400	25.0	N/A <sup>b</sup>	N/A
Grayson, TX	Am. Legion Post 62	Lease	1956	20	250	17.0	N/A	N/A
Grayson, TX	BPOE Lodge	Lease	1960	20	240	11.7	N/A	N/A
Grayson, TX	Bryant Boat Club	Lease	1960	20	300	10.6	N/A	N/A
Bryan, OK	Camp Sandy Pt. Inc.	Lease	1961	20	09	3.9	N/A	N/A
Grayson, TX	Cee Bee Rec. Club	Lease	1961	50	230	11.0	N/A	N/A
Marshall OK	Champlin Emp. Rec.	Lease	1962	20	100	11.0	N/A	N/A
Grayson, TX	Hitex, Inc.	Lease	1956	20	250	18.0	N/A	N/A
Bryan, OK	Lakeview Lodge, Inc.	Lease	1962	20	20	2.8	N/A	N/A
Grayson, TX	Line Material Co.	Lease	1956	20	195	15.0	N/A	N/A
Grayson, TX	Lukehaven Rec. Club	Lease	1961	20	88	3.4	N/A	N/A
Marshall, OK	Sooner Boat Club	Lease	1956	20	200	32.0	N/A	N/A
Grayson, TX	Tanana Rod/Gun Club	Lease	1960	20	300	6.2	N/A	N/A
Grayson TX	Texins Association	Lease	1960	31	450	38.0	N/A	N/A
Grayson, TX	Texins Association	Lease	1960	31	150	13.0	N/A	N/A
Grayson, TX Texas subtotals	Texoma Estates, Inc. 12 Outgrants	Lease	1956	20	240	32.1 201.0	N/A	N/A
Oklahoma sub- totals 4 Outgrants Total - Club Sites 16 Outgrants	4 Outgrants				410	49.7		

Table D.29.6 (Continued)

Location         Grantee         Instrument         Date         Tyres         Annual Rant Paid (\$)         Accessing         to 1974         Planned           Coctage Sites         Barter, Nel         Lease         1955         25         40         0.8         N/A         N/A         N/A           Bryan, OK         Barter, Nel         Lease         1958         25         40         0.8         N/A         N/A         N/A         N/A         N/A           Reschall, OK         Caston, XI         Lease         1959         25         50         1.2         N/A         N/A         N/A         N/A           Gergson, XX         Caston, XX         Catter, N. E.         Lease         1952         25         60         1.2         N/A         N/A         N/A           Gergson, XX         Catter, N. E.         Lease         1952         25         60         1.2         0.8         N/A         N/A         N/A           Gergson, XX         Catter, Discase         1952         25         60         1.2         0.8         N/A         N/A         N/A           Gergson, XX         Marchillor         Gergson, XX         Catter, Discase         1952         25         1.4				Rental				Invest	tment
Cortage Sites         N/A	Location	Grantee	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	to 1974 (\$)	Planned (\$)
Baryan, OK         Barster, Mel Lease         1955         25         40         0.8         N/A           Marzibal, OK         Boiles, C. L.         Lease         1958         20         70         1.3         N/A           Grayson, TX         Burns, C. L.         Lease         1956         25         70         1.3         N/A           Grayson, TX         Caston, J.         Lease         1956         25         60         1.3         N/A           Grayson, TX         Grayson, TX         Grayson, TX         Lease         1952         25         60         1.9         N/A           Grayson, TX         Activition, C. et al.         Lease         1952         25         60         1.9         N/A           Grayson, TX         Activition, T.         Lease         1952         25         60         1.9         N/A           Grayson, TX         Activition, T.         Lease         1953         25         25         0.8         N/A           Grayson, TX         Miguel, J. S.         Lease         1952         25         26         1.4         N/A           Grayson, TX         Miguel, J. S.         Lease         1952         25         26         0.3	Cottage Site								
Marzibali, OK         Boiles, C. I.         Isase         1958         20         70         1.3         NA           Grayson,TX         Burns, C. I.         Lease         1950         25         50         1.2         N/A           Grayson,TX         Clark, R. E.         Lease         1950         25         60         1.3         N/A           Grayson,TX         Hilton, C. T.         Lease         1952         25         60         1.3         N/A           Grayson,TX         Hilton, C. T.         Lease         1952         25         60         1.3         N/A           Grayson,TX         Markad, G. et al.         Lease         1952         25         60         1.9         N/A           Grayson,TX         Antenieva, R. C.         Lease         1951         25         60         0.8         N/A           Grayson,TX         Kafenberger, R. C.         Lease         1951         25         25         1.4         N/A           Grayson,TX         Migual, J. S.         Lease         1952         25         1.4         N/A           Grayson,TX         Anteniell, S. A.         Lease         1952         25         1.4         N/A <t< td=""><td>Bryan, OK</td><td>Baxter, Mel et al.</td><td>Lease</td><td>1955</td><td>25</td><td>07</td><td>0.8</td><td>A.N</td><td>N/A</td></t<>	Bryan, OK	Baxter, Mel et al.	Lease	1955	25	07	0.8	A.N	N/A
Grayson,TX         Burns, C. L.         Lease         1949         25         50         1.2         N/A           Marrhall, OK         Caaton, J.         Lease         1950         25         60         1.8         N/A           Grayson, TX         Hilton, C. T.         Lease         1950         25         60         1.3         N/A           Grayson, TX         Hilton, C. T.         Lease         1952         25         60         1.9         N/A           Grayson, TX         Middle, C. t. d.         Lease         1952         25         60         1.9         N/A           Grayson, TX         Adferbridger, R. C.         Lease         1953         25         0.8         N/A           Marrhall, OK         Middle, J. S.         Lease         1950         25         1.4         N/A           Grayson, TX         Murrell, S. A.         Lease         1952         25         1.4         N/A           Grayson, TX         Murrell, S. A.         Lease         1952         25         0.3         N/A           Grayson, TX         Rameey, J. L.         Lease         1952         25         0.3         N/A           Grayson, TX         Sasstin, F.         <	Marshall, O		Lease	1958	20	70	1.3	N/A	N/A
Marzhall, OK         Clark, R. E.         Lease         1950         25         40         1.8         N/A           Grayson, TX         Clark, R. E.         Lease         1952         25         40         1.3         N/A           Grayson, TX         Hilton, C. T.         Lease         1952         25         60         1.9         N/A           Grayson, TX         Morard, G. et al.         Lease         1952         25         60         1.9         N/A           Grayson, TX         Kolasy, R. C.         Lease         1952         25         60         1.7         N/A           Marshall, OK         Kolasy, R. C.         Lease         1951         25         25         0.8         N/A           Grayson, TX         Mignell, J. S.         Lease         1952         25         1.4         N/A           Grayson, TX         Murcell, S. A.         Lease         1953         25         1.4         N/A           Grayson, TX         Rameay, J. L.         Lease         1952         25         0.3         N/A           Grayson, TX         Rameay, J. L.         Lease         1952         25         0.3         0.3         N/A           Grayson, TX	Grayson, TX		Lease	1949	25	20	1.2	N/A	N/A
Grayson, TX         Clark, R. E.         Lease         1956         25         40         1.3         N/A           Grayson,TX         Hilton, C. T.         Lease         1952         25         60         2.4         N/A           Grayson,TX         Howard, G. et al.         Lease         1952         25         60         1.9         N/A           Grayson,TX         Anex, B. L.         Lease         1958         25         60         1.9         N/A           Marshall, OK         Kelisay, R. C.         Lease         1951         25         50         1.7         N/A           Grayson,TX         Kickitillo, T.         Lease         1950         25         50         1.4         N/A           Grayson,TX         Murell, S. A.         Lease         1954         25         50         1.4         N/A           Grayson,TX         Russey, J. L.         Lease         1952         25         0.3         1.4         N/A           Grayson,TX         Russey, J. L.         Lease         1952         25         0.3         0.3         N/A           Grayson,TX         Russey, J. L.         Lease         1952         25         0.6         0.3         0.8<	Marshall, O.		Lease	1950	25	70	1.8	N/A	N/A
Grayson,TX         Hilton, C. T.         Lease         1952         25         60         2.4         N/A           Grayson,TX         Howard, G. et al.         Lease         1952         25         60         1.9         N/A           Grayson,TX         Affenberger, O. A.         Lease         1953         25         0.8         N/A           Marahall, OX         Kaffenberger, C. A.         Lease         1951         25         0.8         N/A           Marahall, OX         Kickirillo, T.         Lease         1950         25         1.4         N/A           Grayson, TX         Mignel, J. S.         Lease         1953         25         1.4         N/A           Grayson, TX         Paternostro, C. J.         Lease         1953         25         10         0.3         N/A           Grayson, TX         Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Grayson, TX         Ramsey, J. L.         Lease         1952         25         10         0.8         N/A           Grayson, TX         Stewart, W. L.         Lease         1952         25         0.9         0.9         0.8         N/A	Grayson, T		Lease	1956	25	40	1.3	N/A	N/A
Grayson,TX         Howard, G. et al.         Lease         1952         25         60         1.9         N/A           Grayson,TX         Kaffenberger, O. A.         Lease         1958         25         60         1.9         N/A           Maraball, OK         Kelsey, R. C.         Lease         1951         25         0.8         N/A           Maraball, OK         Kickfrillo, T.         Lease         1951         25         1.4         N/A           Maraball, OK         Miguel, J. S.         Lease         1955         25         1.4         N/A           Grayson, TX         Murcall, S. A.         Lease         1954         25         1.4         N/A           Grayson, TX         Ramsey, J. L.         Lease         1953         25         10         0.3         N/A           Grayson, TX         Ramsey, J. L.         Lease         1952         25         0.3         0.3         N/A           Grayson, TX         Ramsey, J. L.         Lease         1952         25         0.3         0.3         N/A           Grayson, TX         Stawart, W. L.         Lease         1957         25         60         0.8         0.3         0.8         N/A <t< td=""><td>Grayson, TX</td><td></td><td>Lease</td><td>1952</td><td>25</td><td>09</td><td>2.4</td><td>N/A</td><td>N/A</td></t<>	Grayson, TX		Lease	1952	25	09	2.4	N/A	N/A
Grayson,TX         Annea, B. L.         Lease         1958         20         45         0.8         N/A           Grayson,TX         Kaffenberger, O. A.         Lease         1955         25         25         0.8         N/A           Maraball, OK         Kelsey, R. C.         Lease         1951         25         50         1.4         N/A           Grayson,TX         Miduel, J. S.         Lease         1954         25         50         1.4         N/A           Grayson,TX         Murrell, S. A.         Lease         1954         25         50         1.4         N/A           Grayson,TX         Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Grayson,TX         Ramsey, J. L.         Lease         1952         25         0.3         0.3         N/A           Grayson,TX         Sassin, F.         Lease         1957         25         50         0.3         0.3         0.3         0.3           Grayson,TX         Stevart, W. L.         Lease         1957         25         50         0.3         0.3         0.3         0.3           Grayson,TX         Stevart, W. L.         Lease         1954			Lease	1952	25	09	1.9	N/A	N/A
Grayson,TX         Kaffenberger,         1955         25         0.8         N/A           Marahall, OK         Kolsey, R. C.         Lease         1951         25         50         1.7         N/A           Grayson, TX         Kickirillo, T.         Lease         1950         25         50         1.4         N/A           Marshall, OK         Miduel, J. S.         Lease         1955         25         50         1.4         N/A           Grayson, TX         Murcall, S. A.         Lease         1954         25         50         1.4         N/A           Grayson, TX         Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Grayson, TX         Ramsey, J. L.         Lease         1952         25         50         0.3         N/A           Grayson, TX         Stewart, W. L.         Lease         1950         25         60         0.3         N/A           Bryan, OK         Story, B.         Lease         1950         25         60         0.5         N/A           Grayson, TX         Sullivan, F.         Lease         1954         25         60         0.5         N/A           Grayson,	er.		Lease	1958	20	45	0.8	N/A	N/A
K Calsey, R. C.         Lease         1951         25         50         1.7         N/A           Kickirillo, T.         Lease         1950         25         50         1.4         N/A           Murrell, S. A.         Lease         1954         25         50         1.4         N/A           Paternostro, C. J.         Lease         1954         25         10         0.3         N/A           Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Sassin, F.         Lease         1952         25         50         0.3         N/A           Stewart, W. L.         Lease         1957         25         60         1.0         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Study, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A			Lease	1955	25	25	9.8	N/A	N/A
Kickirillo, T.         Lease         1950         25         25         1.4         N/A           Müguel, J. S.         Lease         1955         25         50         1.8         N/A           Murrell, S. A.         Lease         1954         25         50         1.4         N/A           Paternostro, C. J.         Lease         1953         25         10         0.3         N/A           Ramsey, J. L.         Lease         1952         25         50         0.3         N/A           Sassin, F.         Lease         1957         20         30         0.8         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Marshall, O		Lease	1951	25	50	1.7	N/A	N/A
K         Miguel, J. S.         Lease         1955         25         50         1.8         N/A           Murrell, S. A.         Lease         1954         25         50         1.4         N/A           Paternostro, C. J.         Lease         1953         25         10         0.3         N/A           Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Sassin, F.         Lease         1957         20         30         0.8         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1954         25         40         1.8         N/A	Grayson, TX		Lease	1950	25	25	1.4	N/A	N/A
Murrell, S. A.         Lease         1954         25         50         1.4         N/A           Paternostro, C. J.         Lease         1952         25         10         0.3         N/A           Ramsey, J. L.         Lease         1952         25         50         0.3         N/A           Sassin, F.         Lease         1957         20         30         0.8         N/A           Story, B.         Lease         1950         25         60         1.0         N/A           Sullivan, F.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Marshall, O		Lease	1955	25	20	1.8	N/A	N/A
Paternostro, C. J. Lease         1953         25         10         0.3         N/A           Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Sassin, F.         Lease         1957         20         30         0.8         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Grayson, TX		Lease	1954	25	50	1.4	N/A	N/A
Ramsey, J. L.         Lease         1952         25         10         0.3         N/A           Ramsey, J. L.         Lease         1952         25         50         0.3         N/A           Sassin, F.         Lease         1957         20         30         0.8         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Grayson, TX			1953	25	10	0.3	N/A	N/A
Ramsey, J. L.         Lease         1952         25         50         0.3         N/A           Sassin, F.         Lease         1957         20         30         0.8         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Grayson, TX			1952	25	10	0.3	N/A	N/A
Sassin, F.         Lease         1957         20         30         0.8         N/A           Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Grayson, TX		Lease	1952	25	50	0.3	N/A	N/A
Stewart, W. L.         Lease         1950         25         60         1.0         N/A           Story, B.         Lease         1954         25         25         0.5         N/A           Sullivan, F.         Lease         1955         25         40         1.8         N/A	Grayson, TX		Lease	1957	20	30	9.0	N/A	N/A
Story, B.         Lease         1954         25         25         N/A           Sullivan, F.         et al.         Lease         1955         25         40         1.8         N/A	Grayson, TX		Lease	1950	25	09	1.0	N/A	N/A
Sullivan, F. Lease 1955 25 40 1.8 N/A	Bryan, OK	Story, B.	Lease	1954	25	25	0.5	N/A	N/A
	Grayson, TX		Lease	1955	25	40	1.8	N/A	N/A

"able D.23.6 (Cantinued)

			Rental	T			Investment	ment
Location	Grantee	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	to 1974 (\$)	Planned (\$)
Cottage Sites								
Grayson, TX	Whitehead, W. R. Jr.	Lease	1955	25	15	0.5	N/A	N/A
Grayson, TX	Woods, S. T.	Lease	1956	25		1.0	N/A	N/A
Texas sub- totals	16 Outgrants				\$65	17.2		
Oklahoma subtotals	6 Outgrants				305	7.9		
Total-Cottage Sites	22 Outgrants				006	25.1		
Total - Private Recreation	38 Outgrants				4,400	275.8		

Tulsa, District, Real Estate Division. 1974. Computer dump of outgrant conditions. Tulsa, Oklahoma.

Not available.

1980. Rental for the 16 private club recreation sites totals \$3,500 (9).

Four areas around Lake Texoma are designated as Corps-managed homesite areas: Elm Ridge, Mill Creek, Caney Creek, and Sand Point. As shown in Table D.29.6, rental for 22 leased cottage sites is \$900 for a total acreage of 25.1 acres (9).

Two areas have been leased to states for the operation of state parks. Data on these areas are presented in Table D.29.7. Real Estate Division records show that 1,709.1 acres have been leased to OK, whereas the 1973 Project Resource Management Plan indicates 1,988 acres in this category. The same sources show leases of 423.1 acres and 415 acres, respectively, to TX (5, 9).

The OTRD has two leases on Lake Texoma: 1,579.1 acres for 50 years (beginning 1 October 1951 and terminating on 30 September 2001) and 130 acres for 25 years (beginning on 5 June 1951 and terminating on 4 June 1976) (9).

State revenue bond monies were used to construct lodges in various state parks including Texoma, where the lodge cost \$1,849,752 to construct. Operation of the Texoma Lodge was originally to be under a lease to a private operator but the bidder withdrew before the lodge opened and the state assumed operation (17).

Facilities available at Texoma State Park include: a 104-room lodge and 96 cabins; three playgrounds with picnic and camping areas; 13-building youth camp; trailer facilities (63 with full service) and a dump station; eight combination shower/comfort stations; an airstrip; a nine-hole golf course; a full service marina; and a cafe, grocery store, and gas station facilities (23). The latter five facilities are operated under lease from the State of OK (24). According to the state's Annual Management Plans, which are submitted to the district,

Table D.29.7. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Lake Texoma (Denison Dam).a

			Ren	tal	¥23		Inve	stment
Location	Grantee	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	to 1974 Plann (S) (S)	Planner (\$)
Fish & Wildlife	Texas Game &							
Grayson, TX	Fish Comm.	License	1966	20	0	18.0	N/A	N/A
Grayson, TX	Dept. of Interior	License	1946	Indef.	0	11,429.0	N/A	A/N
Undesignated, OK	Dept. of Interior	License	1946	Indef.	0	13,450.0	N/A	N/A
Undesignated, OK	Dept. of Interior	License	1957	Indef.	0	3,170.0	N/A	N/A
Love, OK	OK Dept. of Wild-	License	1969	25	0	22,027.0	N/A	N/A
Love, OK	OK Game & Fish Dept.	License	1952	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	3,915.0	N/A	N/A
Texas subtotals	2 Outgrants					11,447.0		
Oklahoma subtotals	4 Outgrants					42,562.0	3. 41	
Total Fish & Wildlife 6 Outgrants	6 Outgrants					54,009.0		
Recreation-Public Parks	9							
Marshall, OK	OK Plan. & Res.	Lease	1921	20	0	1,579.1	N/A	N/A
Marshall, OK	OK State of	Lease	1951	25	•	130.0	N/A	N/A
Grayson, TX	Texas St. Parks	Lease	1954	20	0	423.1	N/A	A/N
Johnston, OK	Tishomingo, City of Lease	Lease	1968	10	•	45.0	N/A	N/A
Johnston, OK	Tishomingo, City of Lease	Lease	1761	25	0	312.0	N/A	N/A
Grayson, TX	Whitesboro, City of	Lease	1956	25	•	105.0	N/A	N/A
Texas subtotals	2 Outgrants					528.1		
Oklahoma subtotals	5 Outgrants					2,066.1		
Total Park and	7 Outovente	75 45		25 () 26 () 26 ()				

Fable D.29.7 (Continued)

Oklahoma. of outgrant conditions. Tulsa, Computer dump 1974. Tulsa District, Real Estate Division. Not available,

of Whitesboro. Cindicated in 1973 Project Resource Management Plan as being a license for a city airport. city by concessioner to turned over being as communication dIndicated by recent

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planned expenditures for capital improvements and operation and maintenance were: fiscal year (FY) 1972, \$134,269 (25); FY 1973, \$108,174 (26); and FY 1974, \$157,614 (27). Actual total expenditures for Texoma State Park in FY 1973, however, were \$39,896.84, while total revenue was \$65,992.15 (28).

The state has plans to expend \$299,000 in new facilities and to upgrade existing facilities at Texoma State Park over the next 5 years (29). The park is now in need of landscaping and facility maintenance. Attendance at the state park decreased by 55,165 from 1972 to 1973 and declines were registered in the number of campers and picnickers while attendance remained constant for visitors with trailers. Net income for the Texoma Lodge decreased from \$98,576 in 1970 to \$7,845.14 in 1973 (28). About 35 mi west of Lake Texoma is Lake Murry State Park in Love and Carter Counties. The entire area (approximately 24,700 acres) is under state ownership and the development is similar to that at Texoma State Park (28).

Oklahoma's 1972 Outdoor Recreation Plan projects that demand for outdoor recreation in the 10-county area (State Region 4) will increase, but gradually, and that the demand will be expressed toward regional-type facilities (30).

The Texas Parks and Wildlife Department (TPWD) has a lease for a state park on 423.1 acres at Lake Texoma. The lease is for 50 years beginning on 1 May 1954 (9). The park (Eisenhower State Park) is characterized by rugged shoreline and deep voves but the area is well maintained. Facilities available include a trailer park (full services available), camping areas, screened shelters, restroom and shower facilities, boat ramps, a mini-bike area, and a full service marina (31). The boat facility is a private marine, operated by a concessioner, with 175 moorings.

There is only one access road into the Eisenhower Park and a \$1 per vehicle per day entrance fee is collected by state park staff at the headquarters building. An annual entrance fee permit can be purchased for \$12. Facility-use fees are: campsite - \$1 per site per night for each vehicle; campsites (including trailer sites) - \$1.75 with full service and \$1.50 for water plus electricity or just electricity (31). The charging of entrance fees, which was begun in FY 1967, had some impact on visitation (32); visitation decreased from 184,500 in 1967 to 119,900 in 1969 but increased to 137,500 in 1971 (5). RRMS 1973 data indicate that visitation in 1973 was 170,900. The entrance fee also affected the concession marina and some customers were lost. The concessioner now buys annual entrance fees for his patrons and the cost is added to slip rental (32). During 1969-1970, the state expended \$29,565 for Eisenhower State Park and \$14,715 were generated from entrance fees (33). For the 1972-1973 period, the state expended \$57,549 and \$21,681 were generated from entrance fees (34). No new facilities are planned for 1975.

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There are two areas leased to municipalities as park sites (Table D.29.7) and both are not well maintained. The City of Whitesboro, TX leases 105 acres under a 25 year term beginning on 1 January 1956 (9). Full operation of this area has recently been turned over to a private concessioner (35). The City of Tishomingo has two leases: 45 acres for 10 years beginning on 1 January 1968, and 312 acres for 25 years beginning on 1 July 1972 (9). Both areas are indicated as being leased for park and recreation purposes in the Real Estate Division's 1974 outgrant master, but the 312 acre site is reported in the 1973 Project Resources Management Plan as a license for a city airport.

#### 2. Lake Resources

Recreational fishing is important at Lake Texoma. Native species include channel catfish, flathead catfish, white crappie, large-mouth bass, Kentucky bass, and white bass. Management of these species is handled by the Oklahoma Department of Wildlife Conservation (ODWC), the TDPW, and the USF&WS. The ODWC has stocked about 6,206,655 fish consisting of 10 species; they have also introduced striped bass and walleye and are continuing to stock striped bass. Commercial fishing was allowed in the past but it was halted by the ODWC because of the potential negative impact on the striped bass stocking program (36).

The Holdenville State Fish Hatchery, operated by the ODWC, is located approximately 5 mi northeast of the Washita Arm of Lake Texoma. The hatchery raises a variety of fish but currently stocks Lake Texoma with striped bass only. This program began in 1965 and striped bass success in Lake Texoma has been good (37).

The TDPW has been granted a license for 18 acres of land for the North Central Fishery Station, the regional headquarters for fish and wildlife programs for a 14-county region (Table D.29.7). The station does not have a stocking program in effect but plans to introduce Florida bass to Lake Texoma in the future. Most of the work conducted by the seven-man staff is concerned with fisheries research and water quality monitoring (38).

Since there are no county-wide sewer systems in operation in the lake area, sewage disposal is by septic tanks or oxidation ponds. While water supply is generally by well, some homes acquire water directly from the lake for non-consumptive use.

Lake Texoma water quality is within acceptable standards for contact sports, and municipal and industrial uses (36). However, the Environmental Protection Agency (EPA) has characterized lake waters as

poor quality (1). Lake water is used for irrigation during extreme droughts, for supplementary municipal and industrial water supply for Denison, TX, and as an emergency domestic supply for other towns. The water does not meet the U. S. Public Health Service's minimum standards for potable water (1). Since January 1974, 15 licenses have been issued for irrigation and Denison has used 9 billion gallons of water as a supplementary water supply (3).

The process of eutrophication is being accelerated by the addition of nutrients from agricultural, industrial, and domestic sources in the vicinity of the lake and at upstream sites (36). The effect of water quality on fishing in Lake Texoma is not entirely known, even though the North Central Fishery Station is involved in water quality monitoring of the lake (36). Several dead fish were observed around the small coves at Texoma State Park and below the damsite during the field visit. Both the Red River and Washita Arms contribute large amounts of silt, clay, and dissolved minerals to the reservoir. The salinity content of Lake Texoma is increasing but the effects have not been thoroughly studied (36). Although the Wildlife Plan reported no problems with aquatic vegetation (36), a survey undertaken as part of a recreation study indicated the general public was aware of aquatic vegetation problems and associated it with the dumping of sewage from boats (7). Other effects which might be attributable to declining water quality could be the reduction in three public use activities in the lake from 1966 (1) to 1973 (22): swimming reduced from 29 to 10%; fishing reduced from 60 to 58%; and waterskiing reduced from 7 to 3%.

### 3. Wildlife

The responsibility for fish and wildlife resources at Lake Texoma rests with OK and TX, regardless of ownership of the land (36). The USF&WS has responsibilities for migratory waterfowl and wildlife habitat improvement. As indicated in Table D.29.7, the state and federal

agencies have been granted licenses for a total of 54,009 acres for fish and wildlife management.

There are two national wildlife refuges on the lake; Hagerman NWR in Grayson County, TX has 11,429 acres and Tishomingo NWR in OK has 16,620 acres. Both refuges have public hunting areas (Hagerman open for doves only) and are primarily concerned with migratory waterfowl. Both refuges were well maintained and operated, but the managers complained of low operating budgets and difficulties in obtaining sufficient funds.

Hagerman NWR includes about 3,000 acres of marsh and water and about 8,000 acres of upland habitat and farmland. Approximately 600 acres of land are cultivated by refuge personnel and neighboring farmers on a sharecrop basis (39). In 1965 the refuge entered into 37 6 to 9 month grazing leases and currently about 7,000 acres are grazed (40). About 230 acres were sharecropped in 1965 with the provision that 25% of the crop be left in the field for wildlife (41). There are three full-time personnel at Hagerman NWR (40). Several oil wells are in operation in wetland as well as in upland areas within the refuge.

The Tishomingo NWR, on the Washita Arm of the lake, includes 13,450 acres which were leased in 1946. In 1957, 3,170 acres were added from Corps project land as a hunting management unit (9). During the summer of 1970, approximately 580 acres were cultivated, mostly in wheat, by refuge personnel and there was no indication of share-cropping (42). Operation and maintenance funds for FY 1971 were programmed at \$8,428 and \$3,750 of the total was to be expended for managing hunter activity (42). Currently there are seven full-time personnel. The hunting management unit is zoned for goose, duck, and deer hunting during the respective seasons. At normal pool there are approximately 4,000 acres of Lake Texoma water within the refuge (43).

The water is shallow and during periods of low flow an arm of the lake may become cut off from the Washita River. Siltation problems also exist in the area.

The TDPW requested that approximately 7,600 acres on the upper Red River Arm in Cooke County be licensed to the state but the state has not taken action to consummate such a license (1).

The ODWC has two outgrants totaling 25,942 acres at Lake Texoma for fish and wildlife management (9). Departmental reports indicate that the state recognizes three principal areas at Lake Texoma: Tishomingo Wildlife Management Unit, Texoma Public Hunting Area, and Hickory Creek Public Hunting Area (45). Department program reports indicate that the department entered into a cooperative agreemen with USF&WS in 1958 by which 3,160 acres of the hunting management unit at Tishomingo NWR (not included in above acreage) were transferred to the ODWC (44). A management plan for the Tishomingo Wildlife Management unit was prepared by the department and USF&WS in 1960, and the ODWC funds the program. The 5-year management plan projects an expenditure by the state of \$110,500 (44).

Project reports from the ODWC include three areas (20,190 acres) in the Texoma Public Hunting Area: Washita Arm, 10,171 acres in Johnston and Marshall Counties; Love Valley, 7,746 acres in Love County; and Fobb Bottom, 2,273 acres in Marshall County (46). Washita Arm Public Hunting Unit is adjacent and west of the state-managed Tishomingo Wildlife Management Unit. The area is within the Corps project lands but the Real Estate Division outgrant master does not indicate that this is the number of acres outgranted in Johnson County (see Table D.29.7).

Adjoining the Love Valley unit to the west is the Hickory Creek
Public Hunting Area for which the state reports it has a 50-year license

from the Corps for 3,655 acres (16): however, the Corps indicates that the outgranted area is 3,915 acres (Table D.29.7). One ODWC report states that it has purchased 4,209 acres as an addition to the Hickory Creek Unit (44), where another department report indicated 4,682 acres were purchased for this unit (16).

Within the Texoma Public Hunting Area (licensed to ODWC by the Corps), there are 4,334 acres leased for agriculture and 15,856 acres for grazing (46). Additionally, the department sharecrops approximately 3,500 acres and 40% of the crops is left for wildlife. Five-year plans (1974-1979) indicate expected state expenditures of \$262,800 for the Texoma Public Hunting Area (47) and \$193,200 for the Hickory Creek Public Hunting Area (16).

Of particular interest is the degree and condition of grazing in wildlife areas managed by ODWC under license from the Corps. Valid Corps grazing permits existed within the area licensed to ODWC for wildlife purposes prior to the effective date of the state's license in 1969. The state (47) and the Corps (5) have recognized that much of the area is overgrazed thereby seriously reducing benefits to wildlife. The ODWC has requested the Corps not to renew grazing leases on areas within the state's wildlife units (46). This would, in effect, cancel the transfer of 75% of the funds the Corps receives from the leases being paid to the counties. Nonrenewal of grazing leases in Love County, for example (all of the Corps land in Love County is under a state license for wildlife), would delete (at current rates) \$6,591.50 from Love County revenues (49). Other counties which would be similarly affected are Marshall and Johnston. The state intends to lease a limited number of acres within their licensed area for controlled grazing but revenues generated would go to the state.

The University of Oklahoma has established a biological station near the town of Willis on Lake Texoma. In addition to state-owned

land, the university has a lease for 307.6 acres of Corps-owned land (see Table D.29.5). The university has conducted numerous studies and research programs concerning Lake Texoma.

The Corps identified eight wildlife management units totalling 54,136.6 acres in its draft wildlife plan (36). Other uses of land included in the wildlife units are agriculture, grazing, and quasipublic development (36). Additionally, the wildlife plan identifies the islands in Lake Texoma as natural areas. The two largest islands, Treasure Island and North Island, have minimal development for recreation and are also included in the public recreation site inventory.

#### 4. Other Land Use

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The most notable effect caused by the Corps not being able to acquire mineral rights is the Cumberland Oil Field in the Washita Arm of the lake just below the Tishomingo NWR. Numerous oil wells are in operation on project lands and through engineering considerations, the district has assisted in the Cumberland operation. The district constructed two dikes to protect the low-lying area from flooding. One dike, approximately 1 mi in length, runs northeast to southwest along the south bank of the field. The dike located to the northeast of the field is approximately 3 mi long and runs northwest to southeast. Additionally, the district cut a new river channel, known as Cumberland Cut, which diverts water away from the oil field.

In addition to the Cumberland Oil Field there are two other areas within project lands which have concentrations of oil wells. One area is approximately 3 mi northeast of Texoma State Park where there are seven wells in the lake - all visible when crossing the U. S. 70 bridge. The second area is in and around the Hagerman NWR. No spills of significance have occurred but an explosion and fire at one of the rigs on Hagerman NWR, though causing little damage, caused much concern (40).

A large amount of the project land at Lake Texoma is outgranted to agricultural and grazing interests. The district's draft wildlife plan reports that 60% of the project land (62,994 acres) is under such leases (36). Real Estate outgrant masters for 1974, however, indicate that the total is approximately 52% or 55,426 acres (see Table D.29.8). Furthermore, the draft wildlife plan states that 70% of this outgranted acreage is either overgrazed or in poor range condition, 15% is in very poor condition, and that 15% can be considered in fair to good range condition. The district, in its "Instructions for the Management of Land Leased for Agricultural and Grazing Purposes" (50), does not specify a definition for heavy, moderate, or low grazing nor does it indicate that there is a maximum number of animal units which would be allowed to graze. The instructions specify that "... the maximum number of animal units at any one time shall not be greater than onefourth of the animal unit months as shown in the lease." No specification of animal unit months was observed in the review of two contracts for agricultural and grazing purposes (51, 52).

As Table D.29.8 indicates, there is considerably more acreage leased for grazing than for agricultural purposes. Rental for grazing and agricultural leases is usually by competitive bid and there is a wide range in the dollar per acre rental (from \$0.08 to \$13.76 per acre) (9). Of the monies received from these leases, 75% is returned to the county in which the outgranted lands lie. According to the data in Table D.29.8, Cooke and Grayson Counties, TX would receive an average of approximately \$14,000 each, while Johnston and Marshall Counties, OK would receive \$2,762 and \$44,610 respectively.

An animal unit is defined as one mature cow or equivalent, and an animal unit month as the forage necessary to feed one animal unit for one month.

Table D.29.8.Outgrants for Agriculture, Grazing, Right of Way, and Other, Lake Texoma (Denison Dam). a

			Rent	tal			Inve	stment
Location	Outgrants	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	to 1974 Planne (\$)	Planned (\$)
Agriculture								
Cooke, TX.	y	Lease	1	i	11,863	2,839.8	N/Ab	N/A
Grayson, TX	2	Lease	1	1	6,240	1,171.7	N/A	N/A
Bryan, OK	•	Lease	1	-	613	120.0	N/A	N/A
Johnston, OK	9	Lease	1	1	2,385	1,008.6	N/A	N/A
Love, OK	•	Lease	1		1,555	629.0	N/A	N/A
Marshall, OK	ø	Lease	1	1	15,000	3,803.8	N/A	N/A
Undesignated, OK	4	Lease	1	1	6,410	3,784.3	N/A	N/A
Texas subtotal	•				18,103	4,011.5		
Oklahoma subtotal	18				25,963	9,344.9		
Total Agricultural	26				44,066	13,356.4		
Grazing								
Cooke, TX	13	Lease	1	1	6,993	3,676.4	N/A	N/A
Grayson, TX	35	Lease	1		11,008	5,267.0	A/N	N/A
Undesignated, TX	2	Lease	1	1	755	533.0	N/A	N/A
Bryan, OK	24	Lease		1	24,433	7,713.0	N/A	N/A
Johnston, OK	7	Lease	1	1	1,298	1,871.0	N/A	N/A
Love, OK	56	Lease	-	-	10,211	4.886.2	N/A	N/A

Table D. 29.8 (Continued)

			Rental	tal			Investment	tment
Location	Outgrants	Instrument	Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	to 1974 (\$)	Planned (\$)
Marshall, OK	70	Lease	1	1	44,480	17,163.5	N/A	N/A
Undesignated, OK	7	Lease	1	1	2,279	960.0	N/A	N/A
Texas subtotal	74				43,189	17,189.4		
Oklahoma subtotal	105				58,268	24,880.7		
Total-Grazing	179				101,457	42,070.1		
Right of Way								
Texas	123				9,661	468.1		
Oklahoma Oklahoma	धा				8,052	623.3		
Total-Right of Way	242				17,713	1,091.4		
Other .								
Texas	28				5,087	5,264.2		
Oklahoma	52				4,249	5,839.6		
Total-Other	57				9,336	11,103.8		

a Tulsa District, Real Estate Division. 1974. Computer dump of outgrant condition. Tulsa, Oklahoma.

b Not available.

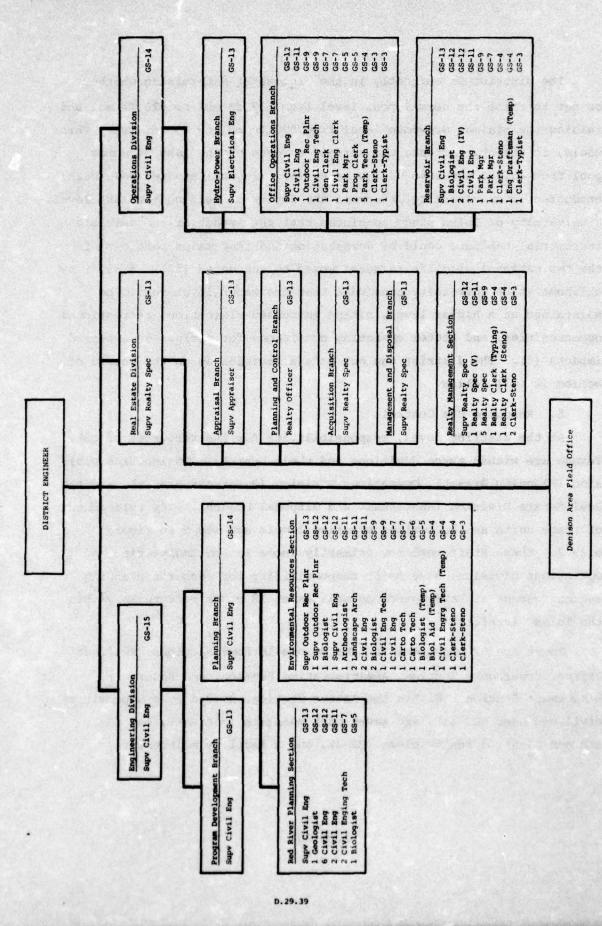
The district is currently in the process of determining whether or not to raise the normal pool level from 617 ft msl to 620 ft msl and raising the minimal drawdown level from 590 ft msl to 605 ft msl. This would, in effect, increase the surface acreage of the lake at normal pool from 88,800 acres to 94,300 acres (1). Several studies have been conducted in an effort to determine the impact of raising the lake level. A University of Tulsa study concluded that the impact of the valuable terrestrial habitats would be devastating and that major portions of the two national wildlife refuges' would be inundated (53). A study by Oklahoma State University concluded that the water level should be maintained at a higher level, citing increased visitation, recreational opportunities, and better operating conditions for marinas as expected impacts (7). The district has not made a decision as to the course of action it will follow.

#### 5. Resource Use Controls

At the district level, responsibilities for the resources of Lake Texoma are within three divisions and their branches: Engineering Division (Planning Branch), Operations Division (Reservoir Branch), and the Real Estate Division (Management and Disposal Branch). The relationship of these units and authorized staffing levels are shown in Figure D.29.2. These staff members, primarily those in the Engineering and Operations Division, have major responsibility for resource planning and management at Lake Texoma as well as at 19 other reservoirs within the Tulsa District.

There are 62 personnel at Lake Texoma in four sections: Resident Office, Powerhouse Section, Administrative Section, and Reservoir Management Section. Within the latter Section, headed by a supervisory civil engineer (GS-11), are seven park managers (one GS-9, one GS-7, and one GS-5), a realty clerk (GS-4), and a facility maintenance

Figure D. 29.2. Recreation-Resource Management Interrelationships - Tulsa Engineer District.



superintendent (GS-9) who directs 32 maintenance/equipment operators. During the summer season, 28 park technicians (temporary) and 12 laborers (temporary) are added to the staff (54).

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Although the district organization chart indicates the presence of park managers at the lake, other reports refer to these staff members as park rangers. The primary activities of the park rangers include inspection of areas under lease, license, permit or concession contract. This inspection includes private buildings, building constructions by private or commercial leases, and recreation facilities. The rangers also patrol project land to detect encroachments, fires, unauthorized use or construction, vandalism, pollution problems, and theft. No encroachment or trespass violations of significance have occurred on the Lake Texoma project (5). Patrol of the lake is also the rangers' duty, and they may issue citations and assist officials in enforcing federal, state, and local laws.

The draft wildlife plan has as one of its stated objectives to place a full-time wildlife biologist at the lake "... to supervise the operation, maintenance, and development of the proposed plan" (36). Until such a position is approved, the wildlife plan recommends that implementation be carried out by the existing staff of park managers and park rangers.

Responsibility for fish and wildlife management resides with the ODWC and the TDPW. Jurisdictional boundaries, particularly on the water, are difficult to determine and there was once a proposal to position a buoy-line to indicate the TX-OK border. This proposal has been disregarded due to its impracticality. At one time the respective states issued a joint fishing license but presently the states issue separate licenses which are valid only in the issuing state (3).

Efforts by the district to implement planned additional recreational facilities have not been successful due to the requirements of cost-sharing. No commitments by nonfederal bodies have been offered (1).

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#### III. KEY FINDINGS

### A. Recreation

- 1. The Corps operates and maintains 47 public recreation sites, two of which are undeveloped. Most of those sites observed were well kept but had some development adjacent to Corps property. Development consisted of homes, trailer parks, stores, bait shops, and boat storage: many of these facilities were in a declining state or repair. Nineteen Corps recreation sites are located in TX and 29 are located in OK.
- 2. In the last 3 years, visitation has increased substantially at TX sites and nominally at OK sites. Planned facility additions to existing sites include swimming beaches at 13 of the TX sites and class A camping areas at three of the OK sites.
- 3. Twenty-two quasi-public leases are extant, half of which are located on Preston Peninsula in Grayson County, TX. Most of the quasi-public sites observed were fenced and locked. Total rent received from all quasi-public sites was \$585; lease rental, when charged, is a nominal \$1 fee except for two leases to VFW for which the rent totals \$575. The 1973 Project Resource Management Plan does not include the VFW leases in discussions of quasi-public areas.
- 4. Concessions at Lake Texoma appear to be profitable. Eleven of the 23 existing concessioners have been operating since 1951. The concessions observed were very well kept and large investments in docking and related facilities have been made. The district is now computing rent according to the graduated rental system. Leases executed more recently (1970 and 1971) are generally for a 10-year period. The effects of the shorter-term leases on the concessioner and his investment-return factors, particularly with 1 or 2 years decreased visitation, are not known. Concession on the TX side are

probably more profitable than those on the OK side. From 1971 to 1973 visitation at the TX concessioner recreation sites increased 226,800 while visitation at OK sites increased only 18,700.

- 5. Four areas around the lake are designated as Corps-managed homesite areas (termed cottage sites in other district reports): Elm Ridge, Mill Creek, Caney Creek, and Sand Point. Of the 447 sites available, approximately 70% have been disposed and only 4% are leased for private recreation. The exact status and origin of the homesite areas is inadequately addressed in district reports; in all the material furnished by the district, only one report mentioned cottage sites and this report stated how many were leased. Private club sites have also been leased and most have been developed as private marinas. The largest private boat club (32 acres) is adjacent to the Caney Creek homesite area.
- 6. Lake Texoma State Park in OK appeared in need of landscape and facility maintenance. The area has had heavy use but visitation has recently declined; net income for Texoma Lodge alone decreased over \$90,000 in 3 years. The state has planned to expend \$299,000 over the next 5 years for new facilities and upgrading existing facilities.
- 7. Eisenhower State Park in TX was very well maintained. The existence of only one controlled access road facilitates maintenance and park control. Assessment of a \$1 per vehicle per day entrance fee, which began in FY 1967, caused a decrease in numbers of visitors visitation in 1973 was almost what it was in 1967. The entrance fee also caused the marina concessioner to lose some customers, but not to go out of business.
- 8. Two areas are leased to cities for parks. These sites are in a state of ill-repair.

- 9. The district contracts one company for refuse collection, sanitary facility maintenance, and mowing. Service has been very satisfactory and the condition of Corps recreation sites reflected conscientious work.
- 10. A large discrepancy exists in reported acreage for public recreation two 1973 district reports state 16,852 acres and 4,365 acres, respectively, whereas RRMS data reports 12,998 acres. Effective planning and management of recreation areas, particularly public recreation areas, is most difficult with a conflicting data base.

## B. Fish and Wildlife

- 1. The range for licensed acreage designated for wildlife management is from 29,130 acres, as given in the 1973 Project Resource Management Plan, to 54,009 acres, as indicated in Real Estate Division 1974 outgrant masters. The differences cannot be explained by the existence of new licenses as there have been none since 1969. Comparison of the above acreage totals to the additional eight wildlife management units discussed in the 1974 draft wildlife plan (54,136 acres) indicates that between 83,000 and 108,000 acres are maintained as wildlife habitat. Double counting of areas used for several purposes and the inclusion of water acreage probably accounts for the high totals.
- 2. The two national wildlife refuges are well maintained and operated. Both refuge managers complained of low operating budgets and difficulties in obtaining sufficient funds. About 3,160 acres in Tishomingo NWR have been transferred to the ODWC.
- 3. At normal pool there are approximately 4,000 acres of shallow water within Tishomingo NWR. During periods of low flow this small area becomes separated from the lake proper. Siltation problems exist in the western area of the refuge.

- 4. Currently, the ODWC is stocking the lake with striped bass and walleye. The introduction of striped bass has been most successful. Commercial fishing has been halted, however, due to its possible negative impact on striped bass populations. The TDPW does not have a stocking program but has plans to introduce Florida bass. They do not anticipate competition problems between the Florida and striped bass.
- 5. The TDPW is rather passive about fishing and wildlife management at Texoma. Its only outgrant (18 acres) is for a regional fishery research station. The ODWC has developed a more comprehensive program including wildlife and fisheries management, and public hunting areas.
- 6. Responsibility for fish and wildlife management resides with the ODWC and the TDPW. Jurisdictional boundaries, particularly on the water, are difficult to determine (a proposal to establish a buoyline along the TX-OK border was found impractical). At one time the respective states issued a joint fishing license but now the states issue separate licenses which are valid only in the issuing state.

### C. Corps and Contiguous Land Use

- 1. Any number of induced economic benefits have been attributed to Lake Texoma and its annual 9 million plus visitors. The University of Oklahoma has attributed the following effects in the surrounding seven-county area directly to the lake in its 24-year life: the population increased by 9,915; total personal income increased by \$129 million; the labor force increased by 1,848; 1,768 new jobs were created; bank deposits increased by \$21.4 million; and retail sales increased by \$204 million.
- 2. There are a few isolated tracts of privately-owned land within the project boundary which were not acquired because they were above the take line. The most significant of these tracts is on Preston Peninsula in TX, approximately 5 mi west of the damsite. There are approximately six subdivisions within this 450 acre tract.

- 3. There are over 70 subdivision developments of various sizes around Lake Texoma. At least half of these are located adjacent to Corps public recreation areas. Most of the subdivisions are in Grayson County, TX within 15 mi of the Denison/Sherman, TX urban area. Proximity to the lake, the availability of private marinas and clubs, and nearness to an urban area make house and trailer sites attractive for buyers and investors. Demand for homes on the TX side of the lake will probably increase because of continued growth in the Denison/Sherman area.
- 4. The district is considering a proposal to raise the normal pool level from 617 ft msl to 620 ft msl. Should the level be raised to the proposed 620 ft msl level, there would be an additional water surface of 5,500 acres and marina sites would be positively affected by deeper water. Although the new level would add water for recreation use it would decrease the total acreage of project land an equivalent amount. Additionally, raising and maintaining the water level would reduce the width of Corps-owned land and thereby encourage private development near the water's edge.
- 5. Of significant concern to OK counties around Lake Texoma is the recent (1969) licensing of Corps project lands to the ODWC. The concern focuses on the loss of revenue to the counties which will result from a departmental decision to request nonrenewal of grazing leases. Overgrazing on designated wildlife areas is acknowledged by the Corps and the state. The Corps, by allowing the areas to be overgrazed, and the state, by seeking wildlife management authority 20 years after the project was completed, have complicated the situation.
- 6. District efforts to implement planned additional recreational facilities have not been successful due to the requirements of costsharing. No commitments by nonfederal bodies have been offered.

# D. Real Estate Programs and Practices

- According to Real Estate Division records, the town of Tishomingo has two areas leased for public park purposes. However, the 1973 Resource Management Plan states that one of these (the 312 acre site) is under a license agreement for use as a city airport.
- 2. Quantitative discussions are absent in district reports concerning the amount of project land which has been or is slated for disposal. The potential impact and conflicts of project land disposal are apparent. The 1973 Resource Management Plan states that all lands are necessary for project purposes but, according to the 1973 survey report, 10,000 acres (approximately 10% of the total project area) are being considered for disposal by the General Services Administration. Equally ellusive is the nature of the development and disposal of cottage sites on Corps lands.
- 3. Personnel who were with the OSPD at the time of lodge and cabin construction at Texoma State Park indicated that the state purchased lands from the district. The Real Estate Division had no records of such a transaction and maintained that all the land in Texoma State Park was under a Corps ownership.
- 4. The district was unable to acquire mineral rights at the time of land acquisition. Consequently, several areas within the project boundary are in oil production by private companies. Two large dikes and a new river channel were engineered as part of the initial project to keep the Cumberland Oil Field (on Corps property) from becoming inundated.

## E. Corps Organization

1. The major responsibility for recreation and wildlife planning and management appears to be within the Engineering Division, Planning

Branch, Environmental Resources Section. The Reservoir Branch of the Operations Division is composed primarily of civil engineers with only two park managers and one biologist.

- 2. The project staff contains no wildlife biologist although such a position is recommended. The duties of the wildlife biologist would be to implement the Corps prepared wildlife management plan which is now in draft form.
- 3. The district organization chart indicates there are seven park managers at Lake Texoma but other district reports state there are seven park rangers.

# F. Environmental Problems

- 1. Water quality at Lake Texoma is considered poor by EPA and does not meet the U. S. Public Health Service's minimum standards for potable water. Water is used for irrigation in times of drought and as a supplementary water supply by municipalities and industries in Denison, TX. Since January, 15 licenses have been issued for irrigation and Denison has used 9 billion gallons of water as a supplementary water supply.
- 2. The process of eutrophication is being accelerated by the addition of nutrients from agricultural, industrial, and domestic sources in the vicinity of the lake and upstream. Several dead fish were observed around the small coves in Texoma State Park and below the damsite.
- 3. Since there are no county-wide sewer systems in operation in the lake area, sewage disposal is by septic tanks or oxidation ponds. While water supply is generally by well, some homes acquire water directly from the lake for nonconsumptive use.

- 4. Although the Corps' wildlife plan stated that there were no problems associated with aquatic vegetation, another study stated that the general public was aware of aquatic vegetation problems and associated the problem with sewage being dumped from boats.
- A reduction in swimming, fishing, and waterskiing between
   1966 and 1973 may be attributable to declining water quality.
- There have been no oil spills within the project area. An explosion and fire at one rig on Hagerman NWR caused much concern, but little damage.
- 7. Raising the normal pool elevation would inundate large portions of both national wildlife refuges.

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